REMARKS

Amendment to the Specification

Applicants enclose herewith a substitute specification pursuant to 37 CFR 1.125. A marked-up version of the specification showing matter being deleted in overstrike and matter added underlined is submitted, as well as a version in clean form without markings as to amended material. Amendments to the specification were made to correct grammatical inconsistencies and typographical errors. No new matter has been added.

Amendment to the Claims

Applicants have amended the claims to conform to U.S. practice. The new claims are based upon original Claims 1-30. No new matter has been added.

Abstract

Applicants enclose an Abstract on a separate sheet. No new matter has been added.

Examination and a favorable reply are respectfully requested.

Respectfully submitted,

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Enclosures

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Appln # 10/523,712
Redlined Specification

10/523,712
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~~DESCRIPTION~~

~~(~~Elastic Fabric and Elastic Cover ~~Top~~ Material~~)~~

~~Technical Field~~

Field of the Invention

~~[0001]~~

The present invention relates to an elastic cover ~~top~~ material which is used as a cover for pillows, cushions, benches, backrests, armrests, chairs, seats beds, mattresses and ~~a~~ the like~~, all of which are used for supporting ones limbs, by weighting or weighing on or sitting in~~.

~~Background Art~~

Background of the Invention

~~[0002]~~

~~This kind of~~ Conventional elastic cover ~~top~~ materials according to the prior art include fabric, leather and the like, and are used to cover ~~is formed by covering such a~~ porous ~~porosity~~ constructions such as urethane foam or other resin foams, ~~or by covering~~ stratified formations which are formed by ~~stratifing~~ stratifying polyester fiber or other fibers, ~~with such a flexible top material as fabric, leather and a like. This kind of elastic top materialls are also formed by covering a~~ as well as spring constructions formed from flat springs, coil springs or other springs ~~together with such a flexible top material as fabric, leather and a like~~.

~~[0003]~~

A conventional elastic cover ~~top~~ material effects an agreeable soft feeling, when one's limbs are weighted thereon due to balancing of pressed strain, which may be raised in its thickness direction, and elastic recovery force which may be raised in accordance with the pressed strain. However, in the case ~~caee~~ where the pressed strain rises relatively too little in

comparison with elastic recovery force, hard and painful feeling may be effected. On the other hand, in the case ~~eace~~ where the pressed strain rises relatively too much ~~more~~ in comparison with the elastic recovery force, fatigue ~~fatiguee feeling~~ may ensue ~~be effected~~ since the limbs are supported in an unstable manner. In order for ~~Since~~ the conventional elastic ~~top~~ cover material to effect~~s~~ an agreeable soft feeling due to the balancing of pressed strain and elastic recovery force ~~as that~~, the conventional elastic cover ~~top~~ material has ~~have~~ to be ~~formed in~~ thick. ~~So that, the~~Thus, conventional elastic cover ~~top~~ material, being thick and bulky ~~is hard for carry and~~ occupies good deal of space and is difficult to transport in bulk ~~since it is bulky and hindrance when it is at no use~~. ~~In this connection, it needes~~ There is clearly a need to improve the conventional elastic cover ~~top~~ material in this respect.

~~【0004】~~

Therefore, the present invention is intended to provide an improved elastic cover ~~top~~ material on which limbs are supported stably ~~thereon~~, and which is ~~sthick,~~ thin, lightweight and less bulky as a whole, and which is easy to handle ~~deal with~~.

~~Disclosure of Invention~~

Summary of the Invention

~~【0005】~~

An elastic fabric of the present invention is characterized by the following features: ~~matters~~.

(i) an elastic yarn is applied to warp yarns or weft yarns;~~.~~

(ii) breaking elongation of the elastic yarn is more than 60%, and rate of ~~an~~ elastic recovery after 15% elongation of the elastic yarn is more than 90%;~~.~~

(iii) the elastic fabric has a stress at 10% elongation of more than 150 N/5cm and less than 600 N/5 cm in the direction (X) ~~where~~ lengthwise along the elastic yarn ~~is in continuous without out inside of the elastic fabric~~;~~.~~

(iv) the rate of hysteresis loss ΔE which is calculated by the equation

$\Delta E = 100 \times C / V = 100 \times (V - W) / V$ is 20~45 %
($20 \leqq \Delta E \leqq$ ~~40~~45);~~.~~

Wherein: ~~At this ;~~

(i) V is an integral value which is calculated by integrating the load-elongation equation ($f_0(\rho)$) from 0% to 10% elongation in the direction (X) lengthwise along ~~where~~ the elastic yarn ~~is in continuous without cut inside of the elastic fabric~~, where the load-elongation equation($f_0(\rho)$) is defined by the loading curve (f_0) of the hysteresis in ~~the~~ a load-elongation diagram;~~.~~
(ii) W is an integral value which is calculated by integrating the load-elongation equation ($f_0(\rho)$) from 10% to 0% elongation in the direction (X) lengthwise along ~~where~~ the elastic yarn ~~is in continuous without cut in the elastic fabric~~, where the load-elongation equation ($f_0(\rho)$) is defined by the load-reducing curve (f_1) of the hysteresis in a ~~the~~ load-elongation diagram;~~.~~ and
(iii) $C = V - W$ is the value of hysteresis loss which is calculated as the difference ~~of the values~~ between the integral values V and W.

Brief Description of Drawings
~~【0006】~~

Figures 1~~〜~~-4 are plan ~~plain~~ views of elastic fabrics in accordance with the present invention;~~.~~

Figure 5 is a sectional view of an elastic fabric in accordance with the present invention;~~.~~

Figure 6 is a load-elongation diagram of an elastic fabric in accordance with the present invention;~~.~~

Figure 7 is a perspective view of an elastic fabric in accordance with the present invention;~~.~~

Figures 8~~～~~ and 9 are plan ~~plain~~ views of conventional elastic fabric~~s~~ weaves in accordance with the prior art ~~comparison of the present invention~~;~~.~~ and

Figures 10~~～~~-20 are perspective views of elastic fabrics in accordance with the present invention.

~~Best Mode for Carring Out the Invention~~

Detailed Description of Preferred Embodiments

~~【0007】~~

~~One preferable modified embodiment~~ A preferred embodiment of an elastic fabric according to the present invention has a ~~is to set up (design)~~ ~~density of~~ bulk density (J＝T×G; dtex/cm) more than 17000 dtex/cm. ~~At this,~~ The ~~density of~~ bulk density (J＝T×G) is defined as the product ~~value~~ of average fineness of an elastic yarn (T; dtex/number) and the number of ~~a density of an arrangement of the~~ elastic yarns per unit length (G＝M／L; number/cm) which is calculated by dividing the ~~a~~ number of elastic yarns (M; number) by the length L ~~regular intervals~~ (L; cm) in the ~~orthogonal~~ direction (Y) orthogonal ~~cross at right angles~~ to the ~~prolonging direction (X) where~~ elastic yarns (11) (direction X) ~~prolong~~.

~~【0008】~~

~~Other preferable modified~~ Another embodiment of the present invention is an elastic fabric having a ~~to set up (design)~~ covering rate (K) more than 30 % (K=100×M×D/l≧ 30%). ~~At this,~~ The covering rate (K) is defined as 100 times ~~by dividing~~ the product ~~value~~ (M×D) divided by the length l, wherein M is the number of elastic yarns per unit length in the X direction, D is the average diameter ~~of average diameter~~ of the elastic yarns

(D; cm), which is defined by the square root of the ~~a~~ product ~~value~~(S×k) ~~of modulus of elasticity~~ where ($k = 4 \times \pi - 1$) and S is the areas (S; cm^2) of the cross section of the elastic yarns which are disposed at ~~in the~~ regular intervals(L; cm) in the direction (Y) which is orthogonal to ~~cross at right angles to the prolonging~~ direction (X) ~~where~~ the, lengthwise direction of elastic yarns (11) ~~prolong~~, and l is the length in the Y direction ~~number(M) of the elastic yarns which are disposed in the regular intervals(L;cm)by the regular intervals (L : cm)~~.

~~【0009】~~

In the case of a woven elastic fabric (10) (Figures 4 and 8), elastic yarns may be applied to either warp yarns or weft yarns, inelastic yarns may be used for ~~another. That is, inelastic yarns may be used for~~ intersecting yarns (22) which are orthogonal to ~~is cross~~ the elastic yarns (11) ~~at right angles~~. It is preferable to apply ~~for~~ the woven elastic fabric to woven ~~such a weaving~~ textile designs, where the continuity direction (R) of intersections (20) form ~~draw~~ zigzag lines or radial lines, such as pointed twill weaves, entwining twill weaves, herring-bone twill weaves, skip draft twill weaves, and modified twill weaves, or ~~such~~ a woven ~~weaving~~ textile design, ~~of~~ for which the rate of ~~the~~ intersection (H=P/m) is less than 0.5, such as mat weaves, matt weaves, basket weaves, hopsack weaves, warp-weft weaves, irregular or fancy mat weaves, stitched mat weaves and other modified plain weaves (Figure 4).

~~【0010】~~

It is desirable to design the woven elastic fabric (10) in a manner where the rate of ~~the~~ intersection (H=P/m), which is defined by dividing the number (P) of bending points(p-1,p-2,p-3,p-4) in front and/or in rear of intersections (20) in complete textile design of the woven elastic fabric (10) where the elastic yarn (11) and the intersecting yarn (22) bend and change their dispositions one another from surface side to back side or from

back side to surface side, by the number (m) of the intersecting yarns (22), which consist complete textile design, is ~~to be~~ less than 0.5 ($H=P/m \leqq 0.5$) (Figure 5). It is also desirable to design the woven elastic fabric (10) in a manner where product value($H \times K$) of rate of ~~an~~ intersection (H) and covering rate (K) of the elastic yarn (11) is ~~to be~~ more than 0.1 ($H \times K \geqq 0.1$).

~~【0011】~~

It is further desirable to design the woven elastic fabric (10) in a manner where the ~~density of~~ bulk density (J ; dtex/cm) of the elastic yarn (11) is ~~to be~~ from 0.5 to 3.0 times the ~~density of~~ bulk density (j ; dtex/cm) of the intersecting yarn (22) which is an inelastic yarn and is orthogonal to ~~cross~~ the elastic yarn (11) ~~at right angles~~ ($0.5 \times j \leqq J \leqq 3.0 \times j$). ~~At this,~~ The bulk (J ; dtex/cm) of the elastic yarn is calculated as the ~~a~~ product ~~value~~ of average fineness (T; dtex) and density of the arrangement ($G= n/L$; number/cm) of the elastic yarn (11) which is calculated by dividing number of elastic yarns (n ; number) by the length ~~with the regular intervals~~ (L; cm) in the ~~orthogonal~~ direction (Y) orthogonal ~~cross at right angles~~ to the direction in which the elastic yarns (11) extend ~~prolong~~. In the same way, the bulk (j ; dtex/cm) of the intersecting yarn (22), which is an inelastic yarn, is calculated as the product ~~value~~ of average fineness (t ; dtex) and density of the arrangement ($g=m/L$; number/cm) of the intersecting yarn (22) which is calculated by dividing the number of intersecting yarns (m; number) by the length ~~regular intervals~~(L; cm) in the ~~prolonging~~ direction (X) where the elastic yarns (11) extend ~~prolong~~.

~~【0012】~~

An elastic top material (62) (see Figure 7) is formed by stretching and hanging ~~over~~ the elastic fabric (10), which is applied for supporting limbs, between both frame parts (61a, 61b) which are positioned ~~projected~~ at both sides of a frame (60) in a manner where both frame parts (61a, 61b) are ~~in~~ opposite to one

another. The cushioning surface (63) of the elastic top material is formed from the elastic fabric (10) for supporting limbs. The elastic fabric (10) is stretched over the frame (60) by setting the lengthwise ~~prolonging~~ direction (X) of the elastic yarn (11) orthogonal to ~~in parallel to the oppositing direction where~~ both frame parts (61a, 61b) ~~are in opposite to one another~~, that is, by setting the lengthwise ~~prolonging~~ direction (X) in the width direction of the elastic top material (62).

~~【0013】~~

The elastic fabric is designed by incorporating the elastic yarn (11) into the elastic fabric in a manner where the elastic yarns are located in line either ~~in~~ lengthwise or crosswise, so that the elastic fabric has;

(i) a stress at 10% elongation (F) ~~is~~ more than 150 N/5 cm and less than 600 N/5 cm ($150 \leqq F \leqq 600$; N/5 cm) in the lengthwise ~~prolonging~~ direction (X) where the incorporated elastic yarns are continuous without cut inside of the elastic fabric,

(ii) a stress at 10% elongation (B) in the 45 degree~~s~~ bias direction (Z), where the bias direction has an inclination of 45 degrees to the lengthwise ~~prolonging~~ direction (X), ~~is~~ more than 5% and less than 20% in comparison with stress at 10% elongation (F) in the lengthwise ~~prolonging~~ direction (X), and

(iii) a rate of hysteresis loss (ΔE) at 10% elongation in the prolonging direction(X) ~~is~~ within 20～45 % ($20 \leqq \Delta E \leqq 45$).

The elastic top material (62) is formed by stretching over and by fixing both edges of the elastic fabric (10) to the frame parts (61a, 61b) which are positioned ~~is projected~~ at both sides of ~~a~~ frame (60) and are ~~in~~ opposite one another. In the elastic top material (62) ~~which is formed as that~~, the elastic fabric is deflected into an arched shape in the lengthwise ~~prolonging~~ direction (X) of the elastic yarn (11) when limbs are ~~limds is~~ put on there. Simultaneously, the elastic fabric is also deflected into an arched shape in the orthogonal direction (Y)

~~cross~~ at right angles to the lengthwise ~~prolonging~~ direction (X) of the elastic yarn (11) and is transformed into a moderate shape, ~~then,~~ the weight of limbs ~~loaded on~~ is ~~to be~~ dispersed in all directions of the elastic fabric. ~~So that,~~ The elastic fabric does not effect a hard feeling but recovers its ~~it's~~ original form as soon as the weight of the limbs is removed ~~put away~~. And, a load mark does not remain where the limbs have been put on for a long time.

~~【0014】~~

In the case where ~~of that~~ stress at 10% elongation (F) of the elastic fabric is designed less than 150 N/5 cm, sagging of the elastic fabric due to the weight of limbs increases and the periphery of the sagged portion of the elastic fabric effects a cramped feeling. And, the capacity of the elastic fabric to recover its ~~becomes hard for recovering it's~~ original form after the weight of limbs is removed ~~was put away~~ is diminished. And, a load mark, which may be effected by the weight of limbs, tends to remain over the elastic fabric and results from load-hysteresis fatigue due to the delay in recovering of the original form. On the other hand, in the case where ~~of that~~ stress at 10% elongation (F) of the elastic fabric is ~~designed~~ more than 600 N/5 cm, it becomes unbearable to put limbs on the elastic fabric for a long time, since the elastic fabric effects a hard feeling. In the present invention, a reason to design a rate of hysteresis loss (ΔE) at 10% elongation within 20～45% ($20 \leqq \Delta E \leqq 45$) is that when it is designed less than 20%, an elastic peculiarity of the elastic fabric becomes similar to that of a steel spring and the elastic fabric tends to effect a hard feeling through its ~~though it's~~ elasticity. On the other hand, in the case where ~~of that~~ the rate of hysteresis loss (ΔE) at 10% elongation is designed more than 45%, the elastic fabric effects a deflected, ~~bottomed~~ sticky feeling when limbs are put on it, and it becomes hard for it to recover its ~~it's~~ original form, and load marks tend~~s~~ to remain ~~appere~~ over the elastic fabric after limbs are

removed ~~was put away~~. Then, it becomes hard to obtain cushioning characteristics ~~goods~~ which are rich in soft feeling and load-hysteresis fatigue resistance. In consideration of these matters, the elastic fabric is designed so that stress at 10% elongation (F) is between ~~becomes to~~ 200～400 N/5 cm and the rate of hysteresis loss(ΔE) at 10% elongation is ~~becomes~~ about 25%.

~~【0015】~~

The rate of hysteresis loss ΔE is calculated by dividing the ~~a~~ hysteresis loss (C) by the value (V) wherein ~~. At this;~~ the ~~value of~~ hysteresis loss (C) is calculated as the difference between values (V) and (W). The value (V) is calculated by integrating the load-elongation equation $f_0(\rho)$ from ~~at~~ 0% to ~~at~~ 10% elongation in the direction (X) where the elastic yarn is ~~in~~ continuous without cut in the elastic fabric, and where the load-elongation equation $f_0(\rho)$ is defined by the loading curve(f_0) of the hysteresis in the load-elongation diagram. The integral value (W) is calculated by integrating the load-elongation equation $f_0(\rho)$ from ~~at~~ 10% to ~~at~~ 0% elongation in the direction (X) where the elastic yarn is ~~in~~ continuous without cut in the elastic fabric, and where the load-elongation equation $f_0(\rho)$ is defined by the load-reducing curve (f_1) of the hysteresis in the load-elongation diagram. Detailed calculation ~~calcuration~~ of the rate of hysteresis loss (ΔE) at 10% elongation is explained as follows.

(i) A test piece ~~with~~ 50mm in width and 250mm in length ~~which~~ is cut ~~out~~ from the elastic fabric and is positioned ~~set by setting a distance~~ between grips spaced 150mm apart in a load-elongation testing machine where the loading-elongating velocity is adjusted to ~~in~~ 150mm/min. and an initial load is adjusted to ~~in~~ 4.9 N.

(ii) The test piece is pre-elongated 10% by loading.

(iii) The test piece is conditioned by decreasing the load to the ~~till~~ initial load.

(iv) After this ~~the~~ conditioning, the test piece is elongated

10% and the loading curve (f_0) of the hysteresis is drawn in ~~the~~ cartesian coordinates with the elongation axis (X_ρ) and the load axis (YF).

Subsequently, load decreases until ~~till~~ the initial load (F_0) is reached and the load-reducing curve (f_1) is drawn (Fig. 6). In the cartesian coordinates, the loading hysteresis area (V), which is bounded by ~~enclosed with~~ the loading curve (f_0), the line ($F_{10}-\rho_{10}$) which passes through the ~~at~~ 10% elongation loading point (F_{10}) and crosses at right angles to the elongation axis (X_ρ), and the elongation axis (X_ρ), is measured. Also, the reducing hysteresis area (W) which is bounded by ~~enclosed with~~ the load-reducing curve (f_1), the line ($F_{10}-\rho_{10}$) which passes through the ~~at~~ 10% elongation loading point (F_{10}) and crosses at right angles to the elongation axis (X_ρ), and the elongation axis (X_ρ), is measured. The hysteresis loss (C) is calculated as the ~~a~~ difference (V−W) between the loading hysteresis area (V) and the reducing hysteresis area (W). Then, the rate of hysteresis loss (ΔE) is calculated by dividing the hysteresis loss(C) by ~~with~~ the loading hysteresis area(V).

~~【0016】~~

A reason to design fabric having stress at 10% elongation (B) in the 45 degrees bias direction (Z), which ~~where~~ has an inclination of 45 degrees to ~~o~~ the lengthwise ~~prolonging~~ direction (X), to more than 5% and less than 20% in comparison with the stress at 10% elongation (F) in the lengthwise ~~prolonging~~ direction (X) is explained as follows. ~~That is,~~ In the case where stress at 10% elongation (B) in the 45 degrees bias direction (Z) becomes less than 5% of the stress at 10% elongation (F) in the lengthwise ~~prolonging~~ direction (X), where the elastic yarn is ~~in~~ continuous, the elastic fabric loses its capacity ~~becomes hard~~ to recover its original form after the limbs are removed ~~was put away~~, and knitted ~~knitting~~ textile

designs or woven ~~weaving~~ textile designs of the elastic fabric become~~s~~ transformable, that is, a distortion of so-called textile opening tends to occur ~~raise~~ due to slipping of yarns (11, 22). On the other hand, in the case where stress at 10% elongation (B) in the 45 degree~~s~~ bias direction (Z) becomes more than 20% of the stress at 10% elongation (F) in the lengthwise ~~prolonging~~ direction(X), the elastic fabric tends to effect a ~~be effected~~ hard feeling, since the distortion of knitted or woven ~~knitting or weaving~~ textile designs of the elastic fabric is less ~~becomes hard~~ ~~arising~~, the weight of limbs loaded on the elastic fabric is not dispersed in all directions, and sagged recesses are hardly formed according to the shape of limbs at the portion where limbs are placed on the fabric ~~was put on~~, then limbs are ~~in movable and are~~ not supported in a stable manner.

~~【0017】~~

A reason to design the ~~density of~~ bulk density (J＝T×G; dtex/cm) of the elastic yarn (11), which is defined as the product ~~value~~ of the average fineness of an elastic yarn (T; dtex/number) and the density of the arrangement of the elastic yarn (G＝M／L; number/cm), more than 17000 dtex/cm, is explained as follows. ~~That is,~~ In the elastic fabric, when the elastic yarns are ~~in~~ parallel and neighboring so closely as to touch one another, and when each of them does not stretch independently, and when tensile stress acts on every one of them, the tensile stress is distributed ~~propagated~~ and acts on other~~s~~ ~~which are~~ ~~in~~ neighboring yarns. In such a way, weight of the limbs is distributed ~~propagated~~ from one yarn to another, ~~in order.~~ so that~~,~~ only a few elastic yarns (11) do ~~does~~ not slip ~~slipe~~ at the extreme limits ~~extremely limited portion~~ of the elastic fabric. Then, the elastic fabric is ~~to be~~ designed so that some~~what~~ distortion of the knitted or woven ~~knitting or weaving~~ textile design~~s~~ is distributed over ~~caused slightly by~~ a lot of elastic yarns so that ~~as far as~~ the elastic fabric returns to ~~turns into~~ its ~~it's~~ original form after the limbs (or load or

weight) are removed ~~was put away~~. Accordingly ~~In accordance with such a way~~, the elastic fabric becomes rich in load-hysteresis fatigue resistance and load marks ~~becomes~~ hardly remain in the portion of the fabric where the limbs were supported ~~was put o~~n for a long time. In consideration of these matters, the ~~density of~~ bulk density (J=T×G; dtex/cm) of the elastic yarn (11) should have a value of ~~is to be designed~~ more than 17000 dtex/cm, thus stress at 10% elongation (F) in the lengthwise ~~prolonging~~ direction (X), where the elastic yarn (11) is ~~in~~ continuous, should have a value of ~~is to be designed~~ more than 150 N/5 cm and less than 600 N/5 cm, and stress at 10% elongation (B) in the 45 degree~~s~~ bias direction (Z) should have a value of ~~is to be designed~~ more than 5% and less than 20%. As a result, it becomes easy ~~easily~~ to set up the rate of hysteresis loss (ΔE) at 10% elongation in the lengthwise ~~prolonging~~ direction (X) within 20～45%.

~~【0018】~~

For~~m~~ the same reason, the covering rate (K) of the elastic yarn (11) should be ~~is set up~~ more than 30%. When ~~Especially, in the case where~~ the covering rate (K) of the elastic yarn (11) is ~~set up~~ more than 30%, the ~~a lot of~~ elastic yarns, which are arranged densely ~~in dence~~, increase the elongation of ~~accelerates to elongate~~ the intersecting yarns (22), which are ~~is~~ orthogonal to ~~cross~~ the elastic yarns (11) ~~at right angles~~. The ~~Since such a lot of~~ elastic yarns act~~s~~ as ~~if it were~~ a wedge which is inserted ~~was picked~~ into the ~~an~~ arrangement which is formed by the intersecting yarns (22). Therefore, the weight of limbs is easily distributed ~~propagated~~ between every adjacent elastic yarn~~s~~ ~~in order from one to another~~ through the intersecting yarns (22). As a result, the elastic fabric becomes elastically conformable ~~rich in elastical transformablity~~ so as to fit the shape of limbs which are put thereon and also becomes ~~rich in~~ soft ~~feeling~~ and resilient ~~load-hysteresis fatigue resistance~~.

~~【0019】~~

The elastic yarn (11) is woven or knitted in the elastic fabric in a manner to be in continuous as a whole being intermittent~~ly~~ partially in the width direction of the fabric or in a manner to be in continuous completely through the full width of the fabric, or in a manner to be in continuous as a whole being intermittent~~ly~~ partially in the length direction of the fabric or in a manner to be in continuous completely through the full length of the fabric. It is desirable to set up the ~~density of~~ bulk density (J) of the elastic yarn to be more than 17000 dtex/cm by designing the average fineness (T) of the elastic yarn in thick and by designing the density (G) of the arrangement of the elastic yarn in loose so that the arranged situation of the elastic yarn is easily kept in line. It is also desirable to compose the elastic yarn as a type of monofilament yarn so that the arranged situation of the elastic yarn is easily kept in line. However, where ~~in the case of that~~ the elastic yarn is composed of multiple fibers or yarns as a type of multifilament yarn, the number of the fibers or the number of single yarns of the elastic yarn should be set up less than 5 (threads). That is, the elastic yarn should be composed of several thick monofilament yarns in a shape as if these yarns were drawn in parallel. The elastic yarn may be composed together with elastic fibers and inelastic fibers in ~~seath~~ sheath core shape by twining and covering the elastic fibers with the inelastic fibers.

~~【0020】~~

Figures 1~~～~~ -4 show examples of the textile design of the elastic fabrics. In the elastic fabric shown in Figure 1, the inelastic yarns (the intersecting yarns (13)) form a base weft knitted fabric. The elastic yarns (11) are threaded in the base weft knitted fabric and pass under the space between the needle loops (40, 40) of every neighboring wales in each course and are continuous in line in the knitting width direction(Γ). In the elastic fabric shown in Figure 2, the inelastic yarns (the

intersecting yarns (13)) form the base warp knitted fabric. The elastic yarns (11) are threaded in the base weft knitted fabric and pass through the space between the needle loop (40) and the sinker loop (50) and are in continuous in line in the knitting width direction(Γ). In the elastic fabric shown in Figure 3, the base warp knitted fabric is formed with the inelastic yarns (13x) which form the chain stitched rows in line in the knitting length direction and the inelastic inserted yarns (the intersecting yarns 22a) which are connecting the adjacent chain stitched rows. The elastic yarns (11) are threaded in the base warp knitted fabric and pass through the space between the adjacent chain stitched rows (39, 39) in a manner of passing over the inelastic inserted yarn (22a) and passing under the inelastic inserted yarn (22a) in each course and are in continuous in line in the knitting length direction (Σ).

~~【0021】~~

As shown in Figures 1~~∼~~-3, in the elastic knitted fabric, it is desirable to apply ~~the~~ inelastic yarn to all of the intersecting yarns (22) which cross the elastic yarns (11) which are ~~is~~ continuous ~~in line~~. Also, as shown in ~~the~~ Figures 1~~∼~~-3, in the elastic knitted fabric, the elastic yarn (11) may be arranged ~~in line~~ weftwise and warpwise. However, in the elastic woven fabric, in consideration of easiness in the weaving process, it is desirable to apply an elastic yarn (11) to the weft yarn, and to apply an inlastic yarn to the warp yarn (that is, the intersecting yarn 22). Figure 4 shows the elastic woven fabric wherein the elastic yarn is applied to the weft yarn and the inlastic yarn is applied to the warp yarn.

~~【0022】~~

The elastic knitted fabric is deformable ~~transformable~~ lengthwise and crosswise, since the ~~base~~ warp knitted fabric is formed with arched needle loops (40) and arched sinker loops (40) where the yarns are bent into arched shapes. Therefore, there is

not a significant ~~special~~ difference between the stress at 10% elongation (B_1) in the 45 degree~~s~~ leftwise bias direction (Z_1), which ~~where~~ has a left-wise inclination of 45 degrees from ~~against~~ the lengthwise ~~prolonging~~ direction (X), and the stress at 10% elongation (B_2) in the 45 degree~~s~~ rightwise bias direction (Z_2), which ~~where~~ has a rightwise inclination of 45 degrees from ~~against~~ the lengthwise ~~prolonging~~ direction(X). Thus, the weight of limbs, which is loaded on the elastic knitted fabric, is distributed ~~disperse~~ in all directions. In this connection, however, in the elastic woven fabric, the difference between stress at 10% elongation (B_1) in the 45 degree~~s~~ leftwise bias direction (Z_1) and stress at 10% elongation (B_2) in the 45 degree~~s~~ rightwise bias direction(Z_2) becomes larger in accordance with the ~~a~~ manner of the continuity of the intersection points (20) in the woven ~~weaving~~ textile design. Therefore, the elastic woven fabric is ~~becomes~~ lacking in load-hysteresis fatigue resistance in comparison with the elastic knitted fabric in accordance with the difference of stress at 10% elongation between the 45 degree~~s~~ leftwise bias direction (Z_1) and the 45 degree~~s~~ rightwise bias direction (Z_2). To decrease the difference of stress at 10% elongation, the satin weave, which lacks continuity ~~course of action~~ in the disposition ~~disposion~~ of the intersection points (20), may be applied to the elastic woven fabric. However, by the application of the satin weave, the elastic woven fabric, which is rich in load-hysteresis fatigue resistance, is not obtained, since the satin weave lacks fixity ~~fixedness~~ between the warp yarn and the weft yarn, so that stress is hardly distributed ~~propagated~~ from one yarn to another ~~in order~~ between adjacent elastic yarns.

~~【0023】~~

Thus, woven ~~weaving~~ textile designs where the intersection points (20) are disposed in zigzag and/or radial manner in the continuity direction (R) such as pointed twill weaves, entwining twill weaves, herring-bone twill weaves, skip draft twill weaves

and modified twill weaves, or woven ~~weaving~~ textile designs for ~~of~~ which the rate of the intersection (H=P/m) is less than 0.5, such as mat weaves, matt weaves, basket weaves, hopsack weaves, warp-weft weaves, irregular or fancy mat weaves, stitched mat weaves and other modified plain weaves, are applied to the elastic woven fabric. In the elastic woven fabric wherein ~~which is applied~~ such a weaving textile design is applied, the intersection points (20) continue in the 45 degree~~s~~ leftwise bias direction (Z_1) and in the 45 degree~~s~~ rightwise bias direction (Z_2) at the same rate. ~~,~~ As a result, the fixity ~~fixednesses~~ between the warp yarns and the weft yarns is maintained ~~are kept~~, and the manner~~s~~ of the continuity of the intersection points (20) in the 45 degree~~s~~ leftwise bias direction (Z_1) and in the 45 degree~~s~~ rightwise bias direction (Z_2) become even. Therefore, large differences in ~~of~~ stress at 10% elongation (B) between those bias directions (Z_1, Z_2) does not occur ~~rise~~, and load-hysteresis fatigue resistance of the elastic woven fabric increases.

~~[0024]~~

Furthermore, for an increment of the load-hysteresis fatigue resistance of the elastic woven fabric, the covering rate (K) of the elastic yarn (11) should ~~is to~~ be ~~set up~~ more than 30% so as to make slippage ~~a slipe~~ between the elastic yarns minimal ~~minimize~~ so ~~for reasons of~~ that the elastic yarns (11a, 11b, 11c, ~~…~~ etc.) stick fast to one another and are ~~being~~ collected between the intersection points (20m, 20n) by potential inside shrinking stress of the intersecting yarns (22). This ~~which~~ is effected as a reaction stress when the intersecting yarns (22) are elongated between the intersection points (20m, 20n) ~~result from or through or by the elastic yarns (11a, 11b, 11c, …)~~. However, in the case where the ~~of that~~ covering rate (K) of the elastic yarn (11) is ~~set up~~ more than 30%, and when the fineness of the elastic yarn is ~~set up so~~ thicker than regular fineness which should ~~shoud~~ be ~~set and~~ limited in proportion to the weaving density, the elastic fabric which is rich in load-hysteresis fatigue resistance cannot

be always obtained.

~~【0025】~~

The reason for this is explained as follows. When the density of the warp yarns of the woven fabric is ~~designed (set-up)~~ high ~~dence(tight)~~, a plurality of warp yarns (22a, 22b, 22c), which comprise ~~compose~~ the complete textile design of the woven fabric, are constrained so as ~~in restricted situation~~ to maintain ~~(keep)~~ the width of the arrangement of the warp yarns between the intersections (20a, 20b) by the weft yarns (elastic yarns 11). On the other hand, the weft yarns (11) are ~~is set under~~ stretched ~~situation~~ due to the reaction from the ~~a~~ plurality of warp yarns (22a, 22b, 22c) which are arranged in high density ~~dense(tight)~~ between the intersections (20a, 20b) and which require a force ~~take an action~~ to widen the width of the arrangement of the warp yarns. In the case of a plane ~~plain~~ and fine woven fabric for ~~of~~ which the density of the warp is ~~set up~~ high ~~dense~~, balance between the ~~restricted situation of the~~ weft yarns (11) and the ~~arranged situation of~~ warp yarns (22a, 22b, 22c) is maintained ~~kept~~, and a plane ~~plain~~ configuration ~~situation~~ of fabric is ~~are to be~~ maintained. However, when the number of the warp yarns (22a, 22b, 22c) is ~~are so~~ more than the regular limitation, protuberances appear ~~apperes~~ over the surface of the woven fabric. Since~~,~~ ~~(1)~~ the weft yarns (11) are ~~is~~ brought into extremely strained situation at the inside of the woven fabric, ~~(2)~~ the potential inside shrinking stress, which ~~is to~~ acts to restore the regular length of the weft yarn (11) in proportion to the regular number of warp yarns (intersecting yarns 22a, 22b, 22c), arises at the inside of the woven fabric.~~,~~ ~~(3)~~ Then, the weft yarns (11) are ~~is to be~~ brought into the situation where they ~~it in~~tends to shrink. ~~shrinke,~~ ~~(4)~~ On the other hand, the plurality of warp yarns (22a, 22b, 22c) ~~is~~ also ~~to~~ act to restore the regular width between the intersections (20a, 20b) in proportion to the regular number of warp yarns~~,~~. ~~(5)~~ As a result, the warp yarns (22) tends ~~portionally~~ to swell out in the

thickness direction of the woven fabric. As explained above, in the case where the density of the warp yarns of the woven fabric is ~~designed(set up) so~~ denser ~~(more tight)~~ than the regular density which should be suitably designed ~~(set up)~~ in proportion to the fineness of yarn, the regular plane ~~plain~~ surface of the woven fabric is not maintained ~~(kept)~~. It is the same in the case where the density of the weft is designed ~~(set up) so~~ denser ~~(more tight)~~ than the regular density which should be suitably designed ~~(set up)~~ in proportion to the fineness of the weft yarn (11).

~~【0026】~~

The reason to design ~~(set up)~~ the rate of the intersection (H) less than 0.5 is that the intersecting yarns (22) which cross ~~to~~ the elastic yarns (11) are ~~is~~ not so far elongated between the intersections (20m, 20n) that the undulatory puckers or crimps appear ~~climps appere~~ over the surface of the elastic fabric. ~~That is, the case,~~ Where the rate of the intersection (H) is more than 0.5, ~~means such a case where~~ the frequency of ~~forming of~~ the intersection points (20) formed together with the warp yarns (22) and the weft yarns (elastic yarns 11) is low ~~few~~, and ~~also means such a case where~~ the warp yarns (22) passes over a lot of weft yarns (elastic yarns 11) and float out of the surface of the elastic fabric. In the case where the length (U) of the floating portion of the warp yarn is long, elongation ~~elongate action which acts from a plurality~~ of the elastic yarns (11a, 11b, 11c) ~~to the warp yarn(22)~~ between the intersections (20m, 20n) may be diminished. However, in such a case, a plurality of ~~the~~ elastic yarns (11a, 11b, 11c), which may be included between the intersections (20m, 20n), become~~s~~ free~~ly~~ since the elastic yarns, (11a, 11b, 11c) are not tightly restricted by the intersecting yarns (22). Consequently, the weight of limbs loaded on the elastic fabric cannot be easily distributed ~~propagated~~ from one ~~of the~~ elastic yarn~~s~~ to another ~~elastic yarn between adjacent elastic yarns in order~~.

~~【0027】~~

Therefore, to increase ~~for increasing~~ the ~~of~~ load-hysteresis fatigue resistance of the elastic woven fabric: ~~,~~
(i) the rate of ~~the~~ intersection (H=P/m), which is defined by dividing the number of bending points (p-1, p-2, p-3, p-4) in the front and/or in the rear of the intersections (20) in the ~~complete textile design of the~~ woven elastic fabric (10), where the elastic yarns (11) and the intersecting yarns (22) bend and change their dispositions from the surface side to the back side or from the back side to the surface side ~~each other~~, by the number of the intersecting yarns (22) in ~~which consist~~ the ~~complete~~ textile ~~design~~, is designed less than 0.5 (H =P/m ≦0.5), and
(ii) the product ~~value~~ (H×K) of the rate of ~~an~~ intersection (H) and the covering rate (K) of the elastic yarn (11) is designed to be more than 0.1 (H×K ≧0.1).

Furthermore and preferably~~,~~ for increasing the ~~of~~ load-hysteresis fatigue resistance of the elastic woven fabric:~~,~~
(iii) the ~~density of~~ bulk density (J; dtex/cm) of the elastic yarn (11) is designed from 0.5 to 3.0 times the ~~of~~ ~~density of~~ bulk density (j; dtex/cm) of the intersecting yarn (22) which is an inelastic yarn and crosses ~~to~~ the elastic yarn (11) at right angles (0.5× j ≦ J ≦3.0× j). The ~~At this,~~ bulk density (J ; dtex/cm) of the elastic yarns is calculated as the product ~~value~~ of the average fineness (T ; dtex) and the density of the arrangement (G = n / L ; number/cm) of the elastic yarns (11) which is calculated by dividing the number of elastic yarns (n ; number) by the length ~~with regular intervals~~ (L ; cm) in the ~~orthogonal~~ direction (Y) orthogonal ~~crossing at right angles~~ to the direction in which ~~where~~ the elastic yarns (11) extend ~~prolong~~. In the same way, the bulk density (j ; dtex/cm) of the intersecting yarns (22), which is an inelastic yarn, is calculated as the product ~~value~~ of the average fineness (t ; dtex) and density of the arrangement (g = m / L ; number/cm) of

the intersecting yarns (22) which is calculated by dividing the number of intersecting yarns (m; number) by the length ~~regular intervals~~(L ; cm) in the lenghtwise ~~prolonging~~ direction (X) in which ~~where~~ the elastic yarns (11) extend ~~prolong~~ .

~~[0028]~~

The reason to design ~~(set up)~~ the product ~~value~~ (H×K) of the rate of intersection (H) and the covering rate (K) of the elastic yarn (11) to be more than 0.1 is to ~~that~~ distribute the weight of limbs loaded on the elastic fabric ~~becomes to be easily propagated from one to another~~ between adjacent elastic yarns ~~in order~~. Consequently, adjacent elastic yarns (11, 11) are ~~become~~ not ~~to be~~ restricted tightly by the intersecting yarns (22) but ~~proparly~~ ~~be~~come into contact with one another. ~~,~~ The ~~a~~ weight of the limbs is distributed over ~~loaded comes to disperse~~ all of ~~over~~ the elastic fabric, and then, undulatory puckers or crimps ~~climps~~ which would otherwise result from the tension ~~potential shrinking~~ stress of the intersecting yarns (22) do not appear ~~become not to appere~~ over the elastic fabric.

~~[0029]~~

The rate of ~~the~~ intersection (H) of individual elastic yarns may vary in the textile, but ~~be various in accodance with each of the plural elastic yarns which composes the complete textile design~~. ~~Even in such a case,~~ the average rate of the intersection (H) of the ~~each~~ elastic yarns is designed to be less than 0.5, and the ~~average~~ product ~~value~~ of the average rate of the intersection (H) and the covering rate (K) is designed to be more than 0.1. In the case where the fabric has several kinds of elastic yarns which are different in ~~these~~ finenesse~~s~~ ~~may be applied~~, the average diameter (D) is calculate by dividing the sum of the ~~total~~ diameters ($D_1+D_2+D_3+\cdots\cdots+D_n$) by the number of ~~the~~ different kinds of ~~the~~ elastic yarns.

~~[0030]~~

The reason to design ~~(set up)~~ the bulk density (J; dtex/cm) of the elastic yarns (11) from 0.5 to 3.0 times ~~of~~ the ~~density of~~ bulk density (j; dtex/cm) of the intersecting yarns (22) ($0.5 \times j \leqq J \leqq 3.0 \times j$) is to maintain ~~maintaine~~ ~~(keep)~~ balance between the ~~arranged situation of the~~ weft yarns and the ~~arranged situation of~~ warp yarns. It is desirable to design the ratio (J/j) between the bulk density (J) of the elastic yarns (11) and the ~~density of~~ bulk density (j) of the intersecting yarns (22) to be between 1.0～2.5, and more preferably about 1.0.

~~【0031】~~

To maintain ~~(to keep)~~ the arrangement ~~arranged situation~~ of the elastic yarns (11) in line, the ~~fineness of the~~ intersecting yarns (22), which cross~~es~~ the elastic yarns (11), should ~~is to~~ be ~~designed~~ thinner than the ~~fineness of the~~ elastic yarns (11). ~~,~~ The density of the arrangement (g) of the intersecting yarns (22) should ~~is to be designed~~ denser ~~(more tight)~~, and the ratio (J/j) between the bulk density (J) of the elastic yarns (11) and the ~~density of~~ bulk density (j) of the intersecting yarns (22) should ~~is to~~ be between ~~designed~~ 0.5～3.0. Also, to maintain ~~(to keep)~~ the arrangement ~~arranged situation~~ of the elastic yarns (11) in line, it is desirable to ~~apply~~ ~~(use)~~ ~~such a~~ multi-fiber yarn made from multiple fibers as multifilament yarn, and spun yarn, for ~~to~~ the intersecting yarns (22). Especially ~~Especialy,~~ in the case where ~~the~~ multi-fiber yarn is ~~applied~~ ~~(used)~~ for ~~to~~ the intersecting yarns (22), the tension ~~potential shrinking~~ stress of the intersecting yarns (22) does not act to raise undulatory puckers or crimps ~~climps~~ over the elastic fabric. Although ~~Since, in the intersecting yarns (22) made from from multiple inelastic fibers,~~ latent ~~potential~~ tension ~~shrinking~~ stress may ~~which might~~ be induced in ~~raised and stored at inside of~~ the intersecting yarns (22) in the weaving process, this latent tension stress will ~~be relaxed and~~ gradually disappear ~~in accordance~~ with the passage of time if multi-fiber yarns are used, even if the number of the elastic yarns (11) which might be

included between the intersections (20m, 20n) are numerous ~~is many~~ and the intersecting yarns (22) might be elongated by many ~~a lot of~~ elastic yarns (11) which exist between the intersections (20m, 20n). Thus, to make the elastic fabric dimensionally stable, it is desirable to use ~~apply~~ a multi-fiber yarn for ~~to~~ the intersecting yarns (22).

Embodiment 〔A－1〕

~~【0032】~~

A polyester spun yarn (fineness: 2ply/meter count of 10 in single yarn) is set in the warp direction ~~warping~~ with a density of ~~the warp of~~ 55/10cm. A thermo adhesible sheath core conjugate polyether-ester ~~elastic~~ yarn ~~made of polyether-ester applied to core component polymer and thermo adhesible polymer, of which melting point is lower than core component polymer, applied to sheath component polymer~~ (fineness: 2080 dtex, having the product name of ~~Toyobo Co. Ltd.~~ "Dia-Flora" and is available from Toyobo Co. Ltd.) is ~~applied to~~ used for the weft yarn. This "Dia-Flora" is composed of an elastic core component and a thermo adhesive sheath component of which the melting point is lower than the elastic core component. The fabric is woven in a ~~applied the~~ herring-bone twill weave~~s,~~ as shown in Figure 4, and is woven with a weft density of ~~the weft~~ 155/10cm. The woven fabric is finished ~~up~~ as an elastic woven fabric by passing it through a dry-heating treatment at 190℃~~×~~ for 3 minutes and by thermally adhering the warp yarns (11) and the weft yarns (22). The elastic cover ~~top~~ material (62) is formed by hanging the elastic woven fabric (10) between frame parts and by fixing both edges of the fabric to the frame parts (61a, 61b) which are positioned ~~projected~~ at both sides of a frame (60) apart from one another 50 cm and are located ~~in~~ opposite to one another (Figure 7). The length of the frame part is 45 cm. The fabric (10) was ~~sensory~~ tested ~~is put to the elastic top material (62)~~ by having a subject sit~~ting~~ on it ~~the elastic woven fabric (10)~~. As a result,

the elastic woven fabric (10) was judged ~~estimated~~ to ~~that it~~ effected ~~ed~~ a stable and comfortable feeling ~~and was good in comfortableness in sitting~~.

Comparison 〔A－1〕

~~【0033】~~

A polyester spun yarn (fineness: 2ply/meter count of 10 in single yarn) is set in the warp direction ~~warping~~ with a density of ~~the warp of~~ 55/10cm. ~~A~~ The above-mentioned thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic yarn made of polyether-ester applied to a core component polymer and thermo adhesible polymer, of which melting point is lower than core component polymer, applied to sheath component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd.~~ "Dia-Flora" ~~)~~ used in the Embodiment [A-1] is ~~applied to~~ used for the weft yarn. The fabric is woven in a ~~applied the~~ twill weave~~s~~, as shown in Figure 8, and is woven with a weft density of ~~the weft~~ 155/10cm. The woven fabric is finished ~~up~~ as an elastic woven fabric by passing it through a dry-heating treatment at 190℃ ~~×~~ for 3 minutes and by thermally adhering the warp yarns (11) and the weft yarns (22). The elastic cover ~~top~~ material (62) is formed by hanging the elastic woven fabric (10) between frame parts and by fixing both edges of the fabric to the frame parts (61a, 61b) which are positioned ~~projected~~ at both sides of the ~~a~~ frame (60) apart from one another 50cm and ~~are~~ located opposite to one another (Figure 7). The length of the frame part is 45cm. The fabric was ~~sensory~~ tested by having a subject sit on it ~~is put to the elastic top material (62) by sitting on the elastic woven fabric (10)~~. As a result, the elastic woven fabric (10) was observed ~~estimated~~ to have ~~that it raised~~ a difference of elongation between ~~in~~ the leftwise bias direction and ~~in~~ the rightwise bias direction~~,~~ which effected an unstable feeling, and was not comfortable ~~so good in comfortableness in sitting~~.

Comparison 〔A－2〕

~~【0034】~~

A polyester multifilament yarn (fineness: 1333 dtex) is set in the warp direction ~~warping~~ with a density of ~~the warp of~~ 91/10cm.

~~A~~ The above-mentioned thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic~~ yarn ~~made of polyether=ester applied to core component polymer and thermo adhesible polymer, of which melting point is lower than core component polymer, applied to sheath component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd.~~ "Dia-Flora" ~~)~~ used in the Embodiment [A-1] is ~~applied to~~ used for the weft yarn.

The fabric is woven in a ~~applied the~~ twill weave~~s~~, shown in Figure 8, ~~is woven~~ with a weft density of ~~the weft~~ 155/10cm.

The woven fabric is finished ~~up~~ as an elastic woven fabric by passing it through a dry-heating treatment at 190℃~~×~~ for 3 minutes and by thermally adhering the warp yarns (11) and the weft yarns (22).

The elastic cover ~~top~~ material (62) is formed by hanging the elastic woven fabric (10) between frame parts and by fixing both edges of the fabric to the frame parts (61a, 61b) which are positioned ~~projected~~ at both sides of a frame(60) apart one another 50cm and are located opposite to one another (Figure 7).

The length of the frame part is 45cm.

The fabric (10) was ~~sensory~~ tested ~~is put to the elastic top material (62)~~ by having a subject sit on it ~~sitting on the elastic woven fabric (10)~~.

As a result, the elastic woven fabric (10) was observed to ~~estimated that it~~ raise~~d~~ a difference of elongation between ~~in~~ the leftwise bias direction and ~~in~~ the rightwise bias direction, effect~~ed~~ an unstable and hard feeling, and was uncomfortable ~~bad insitting feeling~~.

Comparison 〔A－3〕

~~【0035】~~

A polyester spun yarn (fineness: 2 ply/meter count of 10 in single yarn) is set in the warp direction ~~warping~~ with a density ~~of the warp~~ of 55/10cm.

~~A~~ The above mentioned thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic~~ yarn ~~made of polyether-ester applied to core component polymer and thermo adhesible polymer, of which melting point lower than core component polymer, applied to sheath component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd. "Dia-Flora")~~ is used in the Embodiment [A-1] is used for ~~applied to~~ the weft yarn.

The fabric is woven in a ~~applied the~~ plain weave~~s~~, shown in Figure 9, is woven with a weft density of ~~the weft~~ 100/10cm.

The woven fabric is finished ~~up~~ as an elastic woven fabric by passing through a dry-heating treatment at 190℃~~×~~ for 3 minutes and by thermally adhering the warp yarns (11) and the weft yarns (22).

The elastic cover ~~top~~ material (62) is formed by hanging the elastic woven fabric (10) between frame parts and by fixing both edges of the fabric to the frame parts (61a, 61b) which are positioned ~~projected~~ at both sides of a frame (60) apart from one another 50cm and are located opposite to one another (Figure 7).

The length of the frame part is 45cm.

The fabric (10) was ~~sensory~~ tested ~~is put to the elastic top material (62)~~ by having a subject sit~~ting~~ on it ~~the elastic woven fabric (10)~~.

As a result, the elastic woven fabric (10) was observed ~~estimated~~ ~~that it does~~ not to raise a difference of elongation between ~~in~~ the leftwise bias direction and ~~in~~ the rightwise bias direction, but it effected an unstable and hard feeling, ~~bottomed~~ as well as a sticky feeling and was uncomfortable ~~bad insitting feeling~~ since the elastic fabric sagged significantly ~~awfully~~ as a whole.

Property datum of Embodiment and Comparison 〔A〕

~~【0036】~~

The following parameters for the above-mentioned embodiment and comparisons are shown in the following Table 1:
(i) stress at 10% elongation (F_1; N/5 cm) in the direction (X) where the elastic yarns (11) extend ~~prolong~~ , (ii) rate of hysteresis loss (ΔE_1) at 10% elongation in the direction (X) where the elastic yarns (11) extend ~~prolong~~ , (iii) stress at 10% elongation (F_2; N/5 cm) in the orthogonal direction (Y) to ~~crossing at right angles~~ the direction (X) where the elastic yarns (11) extend ~~prolong~~, (iv) the rate of hysteresis loss (ΔE_2) at 10% elongation in the orthogonal direction (Y) to ~~crossing at right angles~~ the direction (X) where the elastic yarns (11) extend ~~prolong~~, (v) 10% elongation stress (B_1; N/5 cm) in the 45 degree~~s~~ leftwise bias direction (Z_1) which ~~where~~ has a left-wise inclination of 45 degrees to ~~against~~ the ~~prolonging~~ direction (X), (vi) stress at 10% elongation (B_2; N/5 cm) in the 45 degree~~s~~ rightwise bias direction (Z_2) which ~~where~~ has a rightwise inclination of 45 degrees to ~~against~~ the ~~prolonging~~ direction (X), (vii) bulk density (J; dtex/cm) of the elastic yarns (11), (viii) bulk density (j; dtex/cm) of the inelastic yarns (22), (ix) ratio (J/j) between the bulk density (J) of the elastic yarns (11) and ~~density of~~ bulk density (j) of the intersecting inelastic yarns (22), (x) the covering rate (K) of the elastic yarns (11), (xi) the rate of ~~an~~ intersection (H) of the elastic yarns (11), and (xii) the product ~~value~~ (H×K) of the rate of ~~an~~ intersection (H) and the covering rate (K) of the elastic yarns (11) of the elastic fabrics (10) ~~in above-mentioned embodiment and comparison are shown in following table(1)~~.

〔Table 1〕

~~【0037】~~

	embodiment A－1	comparison A－1	comparison A－2	comparison A－3
stress at 10% elongation in the direction (X) (F_1; N/5 cm)	350	351	360	331
rate of hysteresis loss in the direction (X) (ΔE_1)	30	32	28	35
stress at 10% elongation in the orthogonal direction (Y) (F_2; N/5 cm)	147	152	320	58
rate of hysteresis loss in the orthogonal direction (Y) (ΔE_2)	42	41	42	28
stress at 10% elongation in	26	33	109	37

leftwise bias direction(Z_1) (B_1; N/5 cm)				
stress at 10% elongation in rightwise bias direction(Z_2) (B_2; N/5 cm)	25	20	86	38
bulk of the elastic yarn (J; dtex/cm)	23920	23920	23920	20800
bulk of the inelastic yarn (j; dtex/cm)	11000	11000	12130	11000
ratio of density(J) and density(j) (J/j)	2.17	2.17	1.97	1.89
covering rate of the elastic yarn (K)	52	52	52	46
rate of an intersection of	0.5		0.5	1.0

the elastic yarn (H)		0.5		
product value of rate of intersection(H) and covering rate(K) (H×K)	0.26	0.26	0.26	0.46
estimation	good	normal	bad	bad

~~【0038】~~

Weft knitted fabric is more stretchable than both warp knitted fabric and woven fabric. ~~,~~ It sags excessively ~~sages awfully~~, and effects a cramped and unstable feeling when supporting ~~at a time put~~ limbs ~~on it~~. ~~So that, in the case of~~ When forming an elastic fabric (10) as a weft knitted fabric, it is advantageous if an inelastic yarn (13) is used as ~~applied to~~ a base ~~bace~~ knit~~ted~~ and an elastic yarn (11) is knitted in the base ~~bace knitted fabric~~ in a manner where the elastic yarn continues in line in the knitting width direction (Γ) over at least a plurality of ~~plural~~ wales of at least one course ~~of plural courses~~ so that its stress at 10% elongation (F) in the knitting length direction (Σ) can be ~~designed~~ more than 25N/5 cm. In this case, the bulk density (J ; dtex/cm) of the elastic yarn is calculated as the product ~~value~~ of the average fineness (T; dtex) of the elastic yarns (11) and the density of the arrangement (G; number/cm) of the elastic yarns (11) which are arranged in the knitting length direction (Σ) and is ~~designed~~ more than 17000 dtex/cm (J≧17000 dtex/cm).

~~[0039]~~

In this case, stress at 10% elongation (B) in the 45 degree~~s~~ bias direction (Z), which ~~where~~ has an inclination of 45 degrees to ~~against~~ the ~~prolonging~~ direction (X) of the elastic yarns (11) is ~~designed~~ more than 5 % and less than 20 % of the stress at 10% elongation (F) in the ~~prolonging~~ direction (X) of the elastic weft knitted fabric $(0.05\times F\leqq B\leqq 0.20)$.

~~[0040]~~

~~At this, 「~~To knit an elastic yarn (11) in the base ~~bace knitted~~ fabric in a manner where the elastic yarn continues in line in the knitting width direction (Γ) over at least a plurality of ~~plural~~ wales ~~」~~ means that the elastic yarn may be knitted to form needle loops together with ~~a~~ inelastic yarns every ~~plural~~ wale~~s~~ in a manner that ~~to~~ continues in line in the knitting width direction (Γ) such that the second inelastic yarn (13b) forms needle loops together with the first inelastic yarns (13a) over a plurality of ~~plural~~ wales and continues without forming a needle loop over the ~~plural~~ wales as shown in Figure 10. ~~As that,~~ In the case where the elastic yarn is knitted to form needle loops together with an inelastic yarn over every ~~plural~~ wale~~s~~, it is possible to avoid forming ~~that~~ the portion of the elastic yarn which continues in line over the ~~plural~~ wales without forming a needle loop slip ~~slipe~~ aside from the knitting width direction(Γ). On the other hand, slippings of the needle loops and sinker loops formed of the inelastic yarns are restrained by the elastic yarns and ~~a~~ sagging of ~~on~~ the elastic fabric due to the weight of limbs increases. ~~,~~ Then, the lower stretching elastic fabric which does not effect a painful cramped feeling can be obtained.

~~[0041]~~

The ~~Knitting~~ textile design is not limited to a particular form of knitting. Plain stitch knitting ~~textile design~~, rib stitch knitting ~~textile design~~ and purl stitch knitting

~~textiledesign~~ may be used ~~applied~~ to form the base ~~baee~~ knitted fabric. The base ~~baee~~ knitted fabric formed as a ~~applied~~ plain stitch ~~knitting textile design of the~~ using a weft knit~~ted~~ ~~fabric~~ (10) is shown in Figure 11 and is formed from the inelastic yarns (13) which are ~~is~~ knitted in by replacing floating wales ($\sigma 1$, $\sigma 2$, $\sigma 3$) every one course. In the courses ($\phi 1$, $\phi 2$, $\phi 3$), the first elastic yarn (11a) is inserted in the space between needle loops (40, 40) of adjacent wales ($\sigma 1$, $\sigma 2$). In the course ($\phi 4$, $\phi 5$), the first elastic yarn (11a) and the second elastic yarn (11b) ~~of~~ which have different elasticities ~~elasticlties are different~~ are inserted in the space between needle loops (40, 40) of adjacent wales ($\sigma 1$, $\sigma 2$). In the course ($\phi 6$), the first elastic yarn (11a), the second elastic yarn (11b) and the third elastic yarn (11c) ~~of~~ which have different elasticities ~~elasticlties are different~~ are inserted in the space between needle loops (40, 40) of adjacent wales ($\sigma 1$, $\sigma 2$).

~~【0042】~~

In the case of the weft knitted fabric (10) shown in Figure 10, a float stitch knitting textile ~~design~~ is ~~applied and~~ formed from ~~the~~ second inelastic yarns (13b). The second inelastic yarns (13b) form~~s~~ a needle loop together with the first inelastic yarns (13a) every 6 needle loops (40a, 40b, 40c, 40d, 40e, 40f) in the course where the first inelastic yarn (13a) is knitted in. The sinker loop (50), which is formed from the second inelastic yarn (13b), extends ~~is extending in line~~ in the knitting width direction (Γ) over 5 wales ($\sigma 2$, $\sigma 3$, $\sigma 4$, $\sigma 5$, $\sigma 6$／$\sigma 5$, $\sigma 6$, $\sigma 1$, $\sigma 2$, $\sigma 3$) from the needle loop formed together with the first inelastic yarn (13a) and the second inelastic yarn (13b) to other needle loops formed together with the first inelastic yarn (13a) and the second inelastic yarn (13b).

~~【0043】~~

~~That is,~~ In the case of the weft knitted fabric (10) shown

in Figure 10, the second inelastic yarn (13b) ~~is remained in the situation of yarn since it~~ does not form needle loops over several wales. Therefore, the elongation of the elastic yarn (11) is restrained by the second inelastic yarn (13b). Thus, the lower stretching elastic fabric, which does not cause undulating ~~undulable~~ puckers or crimps ~~climps~~ and which does not effect a painful cramped feeling, can be obtained.

~~【0044】~~

In the case of the weft knitted fabric (10) shown in Figure 10, the elastic yarn (11) is inserted in the space between needle loops of adjacent wales ($\sigma 1$, $\sigma 2$) on every other course ($\phi 2$, $\phi 4$, $\phi 6$) of the base ~~bace~~ knitted fabric which is formed from the inelastic yarn (13) by using a ~~applying~~ rib stitch knit~~ting~~ ~~textile design~~ and by replacing floating wales ($\sigma 1$, $\sigma 2$, $\sigma 3$) every ~~one~~ course.

~~【0045】~~

Figure 12 shows the positional relationship of the needle loops (40) and the sinker loops (50) of the inelastic yarn (13) and the elastic yarn (11) which may be drawn in the knit~~ting~~ ~~textile design paper~~ wherein the needle loop and the sinker loop are drawn in the same shape. However, the appearance of the needle loop (40) and the ~~appearance of the~~ sinker loop (50) of the weft knitted fabric are ~~is~~ not the same. Figure 13 shows the appearance of the weft knitted fabric which may be knitted according to the ~~knitting textile~~ design shown in Figure 12. That is, in the weft knitted fabric shown in ~~f~~Figures 12 and 13,

(i) the average diameter of the elastic yarn (11) may be ~~set up~~ more than 1.5 times the ~~of~~ average diameter of the inelastic yarn (13).

(ii) the ~~In the case of that~~ average diameter of the elastic yarn is ~~set up~~ more than 1.1 times the ~~of~~ average course interval (Lc) of the weft knitted fabric that is equal to the sum of the average diameter of the elastic yarn (11) and average diameter of

the inelastic yarn (13),

(iii) the needle loops (40) and the sinker loops (50) are pushed out from the course (ϕ2) toward the other adjacent ~~other~~ course (ϕ1, ϕ3), where the elastic yarn is not threaded in~~,~~ ~~from the course(ϕ2),~~ where ~~these~~ loops are formed and the elastic yarn is threaded in~~,~~ by the elastic yarn (11) which is threaded in its course(ϕ2).

(iv) ~~In this case,~~ the portions (13x) of the inelastic yarn (13) on the course (ϕ2) is inclined to the knitting width direction (Γ) and the knitting length direction(Σ).

(v) the ~~And, thease~~ inclined portions (13x) form a Λ-shaped appearance.

Therefore, ~~such~~ a ~~pattern as~~ diamond pattern is drawn on the surface of the elastic weft knitted fabric by the portions (13x) of the inelastic yarn (13).

~~[0046]~~

To ~~As~~ this end,

(i) the average diameter of the elastic yarn (11) is ~~set up~~ more than 1.5 times the ~~of~~ average diameter of the inelastic yarn(13),

(ii) the average diameter of the elastic yarn is ~~set up~~ more than 1.1 times of average course interval (Lc) of the weft knitted fabric that is equal to the sum of the average diameter of the elastic yarn (11) and the average diameter of the inelastic yarn(13),

(iii) the inelastic yarn is elongated ~~under the elongated situation~~ where the tension induced in ~~acted to~~ the inelastic yarn in the knitting process is stored inside of the inelastic yarn as latent tension ~~shrinking~~ stress,

(iv) the inelastic yarn does not return to ~~reduce~~ its original relaxed length ~~situation~~ disturbed by the thick elastic yarn after the fabric is taken out from the ~~a~~ weft knitting machine, ~~and~~

(v) the elongation ~~elongated situation~~ of the inelastic yarn

is maintained ~~kept~~ by the thick elastic yarn ~~and fixed~~.
That is, the elastic yarn;

(vi) is established ~~takes an action~~ in the course (φ2) as a wedge picked in between the front course (φ1) and the rear course (φ3),

(vii) widens the space between these two courses (φ1, φ3) and stretches ~~brings~~ the needle loops (40) and the sinker loops (50) formed in the course (φ2) ~~into stretched situation~~, then

(viii) the needle loops (40) and the sinker loops (50) formed in the course (φ2) pull both front and rear needle loops (40) and sinker loops (50) formed in both front and rear courses (φ1, φ3) toward the course (φ2) and stretch ~~bring~~ these loops (40, 50) ~~into stretched situation~~. As above, since the elastic yarn (11) is inserted ~~takes an action~~ in the course (φ2) as a wedge and stretches ~~brings~~ the base ~~bace~~ knitted fabric ~~into stretched situation~~ through the needle loops and the sinker loops, the base ~~bace~~ knitted fabric, which is formed from inelastic yarns (13) and is telescopic in itself as a weft knitted products, is knitted up in telescopic. On the other hand, since the elastic yarn (11) is thicker than the inelastic yarn (13), it is hardly elongated in the knitting process, so that, it is not fixed in elongation ~~elongated situation~~ through the knitting process, its ~~it's~~ elastic property is maintained after the knitting process. In this manner ~~mammer~~, the lower stretching elastic weft knitted fabric which does not effect a painful cramped feeling can be obtained.

~~【0047】~~

Thick elastic monofilament yarn for ~~of~~ which the fineness is more than 500 dtex, and preferably more than 1000 dtex, and further preferably more than 1650～3000 dtex and which has stress at 10% elongation of more than 0.1 cN/dtex, preferably 0.3～0.8 cN/dtex, is used ~~applied~~ for the elastic yarn (11) and is knitted in without significant elongation ~~by hardly elongating~~ in the knitting process.

Embodiment 〔B－1〕

~~【0048】~~

An inelastic polyester multifilament yarn (fineness: 500 dtex) is applied to the base stitch yarn (13). The ~~bace~~ base knitted fabric is knitted using a ~~applied the~~ plain stitch ~~knitting textile design~~, shown in Figures 12 and 13, ~~is knitted with~~ having a density in the wale direction of ~~the wale~~ 12 wales/25.4mm and density in the course direction of ~~the course~~ 44 courses/25.4mm. ~~A~~ The above-mentioned thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic~~ yarn ~~made of polyether-ester applied to a core component polymer and thermo adhesible polymer, of which melting point is lower than core component polymer, applied to sheath component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd.~~ "Dia-Flora"~~)~~ used in the Embodiment [A-1] is ~~applied to~~ used for the inserted yarn (11). The inserted yarn (11) is interknitted in line weftwise every other course (φ2, φ4, φ6) in a manner where it passes over one needle loop (40) and passes under the next one needle loop (40) of the ~~bace~~ base knitted fabric. The weft knitted fabric is finished ~~up~~ as an elastic weft knitted fabric by passing it through a dry-heating treatment at 190 ℃~~×~~ for 3 minutes. In this manner ~~mammer~~, ~~the~~ an elastic weft knitted fabric is obtained ~~where the~~ having an inserted yarn thermally adhered to the ~~bace~~ base knitted fabric ~~is obtained~~.

Comparison 〔B－1〕

~~【0049】~~

An inelastic polyester multifilament yarn (fineness:500 dtex) is applied to the base stitch yarn(13).

The ~~bace~~ base knitted fabric is knitted in a ~~applied the~~ plain stitch ~~knitting textile design~~, shown in Figures 12 and 13, ~~is knitted~~ with a density ~~of~~ ~~in~~ the wale direction of 12

wales/25.4mm and a density ~~of~~ in the course direction of 44 courses/25.4mm.

The above-mentioned ~~A~~ thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic~~ yarn ~~made of polyether-ester applied to core component polymer and thermo adhesible polymer, of which melting point is lower than core component polymer, applied to component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd.~~ "Dia-Flora" ~~)~~ used in the Embodiment [A-1] is ~~applied to~~ used for the inserted yarn(11).

The inserted yarn (11) is interknitted in line weftwise every other course (φ2, φ4, φ6) in a manner where it passes over one needle loop (40) and passes under the next one needle loop (40) of the ~~bace~~ base knitted fabric.

The weft knitted fabric is used for a elastic top material without dry-heating treatment.

Comparison [B－2]

~~【0050】~~

An inelastic polyester multifilament yarn (fineness: 667 dtex) is applied to the base stitch yarn (13).

The ~~bace~~ base knitted fabric is knitted using a ~~applied the~~ plain stitch ~~knitting textile design~~, shown in Figure 10, ~~is knitted~~ with a density ~~of~~ in the wale direction of 12 wales/25.4mm and a density ~~of~~ in the course direction of 44 courses/25.4mm.

The above-mentioned ~~A~~ thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic~~ yarn ~~made of polyether-ester applied to core component polymer and thermo adhesible polymer, of which melting point is lower than core component polymer, applied to sheath component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd.~~ "Dia-Flora" ~~)~~ used in the Embodiment [A-1] is ~~applied to~~ used for the inserted yarn (11).

The inserted yarn (11) is interknitted in every third courses (φ2, φ5) of 6 courses (φ1, φ2, φ3, φ4, φ5, φ6) in line

weftwise in a manner where it passes over one needle loop (40) and passes under the next one needle loop (40) of the ~~bace~~ base knitted fabric.

The weft knitted fabric is finished up as an elastic weft knitted fabric by passing through dry-heating treatment at 190 ℃~~×~~ for 3 minutes.

In this manner ~~mammer~~, ~~the~~ an elastic weft knitted fabric where the inserted yarn ~~is~~ thermally adhered to the ~~bace~~ base knitted fabric is obtained.

Property datum of Embodiment and Comparison 〔B〕

~~【0051】~~

The elastic cover ~~top~~ material (62) is formed by hanging the elastic weft knitted ~~woven~~ fabric (10) obtained in above Embodiment [B-1], Comparison [B-1] and Comparison [B-2] between frame parts ~~made of aluminum pipe, length 40 cm~~, of a frame (60) preferably made of aluminum pipe and having a length of 40cm, where these frame parts are separated ~~aparted~~ 40cm. The ~~sensory~~ test ~~about~~ to determine cramped feeling, stable feeling, hardness, painful feeling and fatigued feeling is executed on ~~put to~~ the elastic top material (62) by sitting on the elastic ~~woven~~ fabric for 10 minutes.

~~【0052】~~

In the case of the elastic fabric of Embodiment [B-1], the portion where it touches ~~to~~ the buttocks sagged slightly, the resistance ~~a repelllency~~ of the sagged portion was not so hard, and cramped feeling, unstable feeling, hardness, painful feeling and fatigued feeling were not felt.

~~【0053】~~

In the case of the elastic fabric of Comparison [B-1], it elongated significantly ~~largely~~ in the knitting length direction, the portion where it touched ~~touches~~ ~~to~~ the buttocks sagged

significantly ~~largely~~, and the periphery of the sagged portion effected a cramped feeling, a ~~bottomed~~ sticky feeling, and a fatigued feeling.

~~【0054】~~

In the case of the elastic fabric of Comparison [B-2], even though a ~~bottomed~~ sticky feeling was not felt to the same degree ~~so hard~~ as the case of Comparison [B-1], due to a roughness of the density of the arrangement of the elastic yarn, the portion where it touched ~~touches to~~ the buttocks sagged significantly ~~largely~~ as a whole, and an unstable feeling was felt.

~~【0055】~~

For the results shown in Table 2 below:

(i) stress at 10% elongation (FC; N/5 cm) in the knitting width direction (Γ),

(ii) stress at 10% elongation (FC; N/5 cm) in the knitting length direction (Σ),

(iii) the rate of hysteresis loss ΔE which is calculated by the equation $\Delta E = 100 \times C / V = 100 \times (V - W) / V$; wherein V is an integral value which is calculated by integrating the load-reducing equation ($f_1(\rho)$), which is defined by the reducing curve (f_1) of the hysteresis in the load-elongation diagram, from 0% to 10% elongation in the knitting width direction (Γ). W is an integral value which is calculated by integrating the load-elongation equation ($f_0(\rho)$), which is defined by the loading curve (f_0) of the hysteresis in the load-elongation diagram, from 0% to 10% elongation in the knitting width direction (Γ).

$C = V - W$ is the value of hysteresis loss which is calculated as the difference ~~in the value~~ between the integral values V and W.

(iv) estimation in the ~~sensory~~ test of the elastic fabrics (10) in the above-mentioned embodiment and comparison are shown in the following table (2).

〔Table 2〕

~~【0056】~~

	embodiment ~~A~~B－1	comparison ~~A~~B－1	comparison ~~A~~ B－2
stress at 10% elongation in the direction (Γ) (FC; N/5 cm)	392	349	277
stress at 10% elongation in the direction (Σ) (FW; N/5 cm)	35	10	23
density of wale (wales/cm)	・9	・9	・9
density of arrangement elastic yarn (number/cm)	・98	・98	・94
bulk of elastic yarn (J) (dtex/cm)	18678	18678	14435
average course interval (Lc)	・58	・58	・77

(mm)			
fineness of inelastic yarn (dtex)	5 0 0	5 0 0	6 6 7
average diameter of inelastic yarn (d) (mm)	・224	・224	・258
fineness of elastic yarn (T) (dtex)	2080	2080	2080
average diameter of elastic yarn (D) (mm)	・458	・458	・458
rate of sum of diameter of elastic yarn and inelastic yarn (D+d) to course interval(Lc) (D+d)÷Lc	・1 8	・1 8	・9 7
rate of hysteresis loss in the direction(Γ) ΔE (%)	3 5	4 4	3 4
adhered situation of yarn in fabric	adhered	unadhere	adhered

estimation by sensory test	good	bad	bad

~~[0057]~~

Sagging ~~manner~~ of the surface of the elastic fabric (10) and reaction from the elastic fabric (10) are partially changable according to the manner in which ~~stretching manner of~~ the elastic fabric (10) is stretched and loaded ~~and loading manner to the elastic fabric (10)~~. To avoid this problem ~~such a trouble~~, it is desirable to form the elastic fabric (10) in a three-dimensional construction~~s~~ with a face fabric (32) formed from face yarns (31) and a back fabric (34) formed from back yarns (33) and to apply the elastic yarn (11) to the back yarns (33) at least as one kind of yarn~~s~~.

~~[0058]~~

Accordingly ~~to such a manner~~, the elongation of the elastic yarn applied to the back fabric is restrained by the face fabric formed from the inelastic yarn.~~,~~ The three-dimensional elastic cover ~~top~~ material which does not partially elongate and sag ~~and~~ is useful for sofas and mattresses ~~can be obtained~~.

~~[0059]~~

In the case of forming the elastic fabric (10) in three-dimensional constructions, in the weaving or knitting process, the face fabric (32) and the back fabric (34) are simultaneously woven or knitted and are connected by one kind of face or back yarns. In the case of weaving, three-dimensional elastic double fabric may be woven as one kind of warp-weft-double woven fabrics by using a conventional loom. Three-dimensional elastic double fabric knitted by using the weft knitting machine is shown in Figure 14. At one portion of the fabric, a double stitch opening

is formed with the face yarn (31) and the back yarn(33). The face fabric (32) and the back fabric (34) are connected through the double stitch opening. Between the face fabric (32) and the back fabric (34), the interspace stratum (36) is ~~may be~~ formed. Three-dimensional elastic double fabric woven by using the double moquette loom is shown in Figure 15. The face fabric (32) is formed in a plain weave textile design with the face warp yarn (31y) and the face weft yarn (31x). The back fabric (34) is formed in a plain weave textile design with the back warp yarn (33y) and the back weft yarn (33x). The interspace stratum (36) is formed between the face fabric (32) and the back fabric (34) which are connected by the connecting yarn (35).

~~【0060】~~

Three-dimensional elastic double fabric knitted by using the double raschel warp knitting machine is shown in Figure 16. The face fabric (32) and the back fabric (34) are connected by the connecting yarn (35). The thickness of the interspace stratum (36) formed between the face fabric (32) and the back fabric (34) may be ~~designed~~ more than 0.3mm. The elastic yarn is used for the back yarn (33) and the connecting yarn (35), and the inelastic yarn is used for the face yarn (31). The face yarns (31) form~~s~~ two kinds of chain stitch openings (38a, 38b) alternating ~~alternately~~ every several courses. The ~~each of the~~ two kinds of chain stitch openings (38a, 38b) are ~~is~~ formed over several courses. One ~~(38a)~~ of the two kinds of chain stitch openings (38a) is formed together with one ~~(31a)~~ of the face yarns (31a) and the other face yarn (31b) which is adjacent to the left side of the one ~~(31a) of the~~ face yarn~~s~~ (31a) in the knitting width direction (Γ).~~,~~ ~~and~~ Another one ~~(38b)~~ of the two kinds of chain stitch openings (38b) is formed together with the one ~~(31a) of~~ face yarn~~s~~ (31a) and another face yarn (31c) which is adjacent to the right side of the one ~~(31a) of~~ face yarn~~s~~ (31a) in the knitting width direction (Γ). Consequently, these ~~this~~ two kinds of chain stitch openings (38a, 38b) ~~are to~~ form

the chain stitch opening row (39) extending in the knitting length direction (Σ) in a zigzag manner. And, openings (37) having an opening area ~~may be~~ more than $1mm^2$ are formed between adjacent chain stitch opening rows (39, 39).~~,~~ Three-dimensional elastic double fabric is knitted up in mesh shape as a knitted net fabric. The back fabric (34) is formed with the ground stitch back yarn (33a) for forming the chain stitch opening row (39) extending in the knitting length direction (Σ) and the inserted back yarn (33b) ~~which~~ is applied for connecting adjacent chain stitch opening rows (39, 39) without forming a needle loop.

~~【0061】~~

Three-dimensional elastic double fabric has ~~is~~ superior insulating properties because ~~in warmth keeping property since~~ the interspace stratum (36) having bag like openings is formed between the face fabric (32) and the back fabric (34). In the three-dimensional elastic double fabric, even though the back fabric (34) may be ~~formed in~~ thick, the softness ~~touch feeling~~ of the face fabric (32) is not adversely affected ~~spoiled~~.~~,~~ Even though the face fabric (32) may be formed in a mesh shape as a knitted net fabric, the shape of the face fabric (32) is stably maintained ~~in stable~~ by the thick back fabric (34).

~~【0062】~~

~~So that,~~ The elastic top material (62) which provides ~~is~~ superior ~~in~~ cushioning ~~property~~, is ~~does~~ not sticky ~~give stuffy feeling~~ and is useful for sofas and mattresses, and may be obtained by using the ~~such a~~ three-dimensional elastic double fabric (10) wherein the ~~that~~ thickness of the stratum (36) is ~~designed~~ more than 0.3 mm. ~~Since,~~ Such thick three-dimensional elastic double fabric (10) provides ~~is~~ superior ~~in~~ cushioning ~~property~~, insulation ~~warmth keeping property~~, and air-permeability so that air flows out from and into the interspace stratum (36) every time ~~when~~ it is compressed and expanded

~~receives cushioning action~~.

~~【0063】~~

Thus, the three-dimensional elastic double fabric, of which the face fabric is formed in a mesh shape, is ~~becomes~~ suitable for sofas and mattresses.

~~【0064】~~

~~Especially,~~The three-dimensional elastic double fabric, wherein the elastic yarn (11) is used as ~~applied for~~ the connecting yarn (35), provides ~~is~~ superior ~~in~~ cushioning, and is especially ~~becomes~~ suitable for sofas and mattresses, and does not effect a sticky ~~stuffy~~ feeling.

~~【0065】~~

Limbs of the human body cannot be supported comfortably on a cushioning surface when the surface is stretched under significant strain on a frame so as to maintain a planar surface.

~~When, the limbs is put on such a cushioning surface where limbs and body may come into contact with is formed and maintained in plain as a plate by straining very strongly and by hanging the elastic fabric over the frame of the elastic top material (10), the reaction acts to limbs from the cushioning surface must cause painful feel and fatigued feeling and it beemes unbearable to put the limbs on for a long time.~~

【0066】

In this regard, in accordance with the present invention, the tensile stresses, which are induced in the ~~act in any one of~~ yarns in two mutually orthogonal ~~continuous~~ directions ~~and also act respectively at least 2 apart portions being apart in the other direction crossing at right angles to that one of yarns continuous direction~~ and also cause ~~act at regular rate of~~ elongation of the elastic fabric at a known rate, are distributed in relation to the deformation of the fabric ~~designed in various~~.

That is, the elasticity ~~elasticlty~~ of the cushioning surface varies ~~is designed partially in various~~ in a manner such ~~of~~ that at one portion, where heavy loads act~~s~~, the fabric sags significantly ~~sages largely~~ and forms a deep recess, while at another ~~and other~~ portion, where heavy loads do~~es~~ not act, the fabric sags less ~~preferably~~ and forms a shallow recess. In such a manner, the cushioning surface accommodates ~~becomes into to fit~~ the shape of limbs. ~~So that,~~In accordance with the present invention, the elastic cover ~~top~~ material (10) ~~which~~ does not cause pain and fatigue ~~effect painful feel and fatigued feeling~~ when limbs are ~~is~~ put on the cushioning surface for a long time ~~can be obtained~~.

~~【0067】~~

In the present invention, ~~[~~the tensile stress at the regular degree ~~rate~~ of elongation of the elastic fabric (hence called "regular tensile strength ~~strengh~~")~~]~~ is defined as ~~means~~ the tensile stress which acts on ~~to~~ the elastic fabric when ~~at a time~~ it is elongated and its ~~it's rate of~~ elongation reaches ~~reachs at regular~~ a degree ~~rate~~ of elongation that is necessary ~~needed~~ to compare the stretching elasticity of different portions of the cushioning surface which may be formed from the elastic fabric. It is preferable to set the "regular tensile strength ~~strengh~~" by the press load which is measured ~~at a time~~ when the degree ~~rate~~ of elongation reaches ~~reachs at~~ the regular degree ~~rate~~ of elongation in a measuring process where the press load~~s~~ is applied to different portions of the cushioning surface where stretching elasticity is to be compared by increasing the press loads until ~~till~~ the degree ~~rate~~ of elongation~~s~~ reaches the regular degree ~~rate~~ of elongation which may be between ~~set up~~ 3%～10% elongation.

~~【0068】~~

In the present invention, "portions spaced apart in at least two mutually orthogonal directions ~~2 apart portions being~~

~~apart in the other direction crossing at right angles to any one of yarns continuous direction~~" means the following two ~~2~~ portions;

(i) in the case of elastic fabric which is formed ~~only with the warp yarn (18)~~ as a warp knitted fabric wherein the warp yarn (18) is ~~in~~ continuous in the length direction (h) of the fabric, two ~~2~~ portions (r-1, r-2) which are apart from one another in the width direction (r), that is, portion (r-1) formed with ~~a~~ warp yarns (18a) is apart from portion (r-2) formed with other warp yarns (18b) (Figure 17).

(ii) in the case of elastic fabric which is formed ~~only with the weft yarn (19)~~ as a weft knitted fabric wherein the weft yarn (19) is ~~in~~ continuous in the width direction (r) of the fabric, two ~~2~~ portions which are apart from one another in the length direction (h), that is, portion (h-1) formed with ~~a~~ weft yarns (19a) is apart from portion (h-2) formed with other weft yarns (19b) (Figure 18).

(iii) in the case of elastic fabric which is formed with ~~the~~ warp yarns (18) which are ~~is~~ continuous in the length direction (h) of the fabric and ~~the~~ weft yarns (19) which are ~~is in~~ continuous in the width direction (r) of the fabric as a weft inserted warp knitted fabric and a woven fabric, two ~~2~~ portions (r-1, r-2) which are apart from one another in the width direction (r) and another 2 portions (hr-1, hr-2) which are apart from one another in the length direction (h) of the fabric, that is, four 4 portions (r-1, r-2, hr-1, hr-2) wherein the yarns are different in connection with either warp yarns (18) or weft yarns (19b) (Figure 19).

~~【0069】~~

As shown in Figure 19, it is desirable for the partial variation of the regular tensile strength ~~strengh~~ to be achieved using ~~thread several~~ various kinds of yarn in ~~respectively~~ different orthogonal ~~any one of the~~ directions ~~which cross at right angles~~. That is, for the partial variation of the regular

tensile strength ~~strengh~~ between two portions, two kinds of yarn are threaded in parallel into the ~~respectively different~~ two portions which ~~where~~ are apart from one another in the direction where other yarn is ~~in~~ continuous in its length direction and is orthogonal to the ~~across the direction where those~~ two kinds of yarn ~~may be in continuous~~.

~~【0070】~~

Two such ~~Such two~~ portions can be shown in Figure 19, wherein the elastic fabric is formed with the warp yarn (18) which is ~~in~~ continuous in the length direction (h) of the fabric, and the weft yarn (19) which is ~~in~~ continuous in the width direction (r) of the fabric, such as a weft inserted warp knitted fabric and a woven fabric. Therein, two kinds of yarn may be applied for the warp yarn (18) and the weft yarn (19). At either two portions (r-1, r-2) which are apart from one another in the width direction (r) or other two portions (hr-1, hr-2) which are apart from one another in the length direction (h) of the fabric, either the kind of warp yarns (18) of the portion (r-1) and the portion (r-2) or the kind of weft yarns (19) of the portion (hr-1) and the portion (hr-2) are varied.

~~【0071】~~

In the present invention, two such ~~such two~~ portions being apart from one another in the direction orthogonal to the direction in which the ~~being across the direction where yarns is in continuous and~~ regular tensile strength ~~strengh~~ acts, that is, positions in ~~of~~ which the regular tensile strength ~~strengh~~ are different from one another, are called ″regular strength ~~strengh~~ different positions″. In the case of the weft knitted fabric shown in Figures 10~~〜~~ -13, the ″regular strength ~~strengh~~ different positions″ are shown as the courses (ϕ1, ϕ2, ϕ3, ϕ4, ϕ5) where several different ~~various~~ kinds of yarn can be selectively threaded in for varying ~~variation of~~ the ″regular tensile strength ~~strengh~~″ according to the kinds of

yarn. ~~So that,~~ In the case of the elastic cover ~~top~~ material (62) which is formed by fitting the knitting width direction (Γ) to the width direction of the frame (i) and by stretching and hanging the elastic weft knitted fabric (10) between frame parts (61a, 61b) (Figure 20), it becomes possible to vary the "regular tensile strength ~~strengh~~" ~~is to act~~ in the width direction at every portion in the depth direction (q).

~~【0072】~~

In the cases of the warp knitted fabric and the warp inserted warp knitted fabric shown in Figures 1~~～~~ -3 , the "regular strength ~~strengh~~ different positions" are shown as the wales (σ1, σ2, σ3, σ4, σ5) where several ~~various~~ kinds of yarn can be selectively threaded in to vary the "regular tensile strength ~~strengh~~" according to the kind of yarn. ~~So that,~~ In the case of the elastic cover ~~top~~ material (62) which is formed by fitting the knitting length direction (Σ) to the width direction of the frame (i) and by stretching and hanging the elastic weft knitted fabric (10) between frame parts (61a, 61b) (Figure 20), it becomes possible to vary the "regular tensile strength ~~strengh~~" ~~is to act~~ in the width direction at every portion in the depth direction (q).

~~【0073】~~

In the case of the weft inserted warp knitted fabric shown in Figure 2, the "regular strength ~~strengh~~ different positions" are shown as the courses (φ1, φ2, φ3, φ4, φ5) where several ~~various~~ kinds of yarn can be selectively threaded in for the variation of the "regular tensile strength ~~strengh~~" according to the kinds of yarn. Similarly, to vary the "regular tensile strength" of ~~and as~~ the wales (σ1, σ2, σ3, σ4, σ5), ~~where~~ several ~~various~~ kinds of yarn can be selectively threaded in, ~~for the variation of the "regular tensile strengh"~~ the variation being according to the kinds of yarn. Therefore, in the case of

the elastic cover ~~top~~ material (62) which is formed by fitting the knitting length direction (Σ) to the width direction of the frame (i) and by stretching and hanging the elastic knitted fabric between frame parts (61a, 61b) (Figure 20), when the weft inserted warp knitted fabric wherein several kinds of yarn having different ~~being various in the stretching~~ elasticity are selectively threaded in the ~~the~~ wales (σ 1, σ 2, σ 3, σ 4, σ 5) ~~is applied to cushioning surface (74)~~, it becomes possible to vary the "regular tensile strength ~~strengh~~" of the cushioning surface (74) ~~is to act~~ in the width direction at every portion in the depth direction (q) of the elastic cover ~~top~~ material (62) (Figure 2). Also, in the case of the weft inserted warp knitted fabric shown in Figure 2, when it is knitted by selectively threading ~~threaded~~ several kinds of yarn, which have different ~~are various in the stretching~~ elasticity, into the wales or the courses, a check pattern with crosswise stripes (75) and ~~a~~ lengthwise stripes (76) is formed ~~drawn~~ depending on the difference of the kind of the yarn and the variation in the "regular tensile strength ~~strengh~~" which may ~~be~~ act in both width and depth directions (i, q) at the "regular strength ~~strengh~~ different positions" ~~becomes variable~~ (Figure 2). ~~Of course,~~ In the case of the weft inserted warp knitted fabric which is knitted by selectively threading ~~threaded~~ several kinds of yarn, which have different ~~are various in the stretching~~ elasticity, into the courses (φ 1, φ 2, φ 3, φ 4, φ 5) ~~only~~, when the weft inserted warp knitted fabric is stretched and hung ~~hanged~~ between frame parts (61a, 61b) by fitting the knitting length direction (Σ) to the width direction of the frame (i), it is possible to vary the "regular tensile strength"~~, which may be act~~ in the depth direction (q), at every portion in the width direction (i).

~~[0074]~~

For ~~In the cases of the~~ woven fabric, the "regular strength ~~strengh~~ different positions" are different positions in the width direction (r) where several ~~various~~ kinds of warp yarns (18) can

be selectively arranged, and different positions in the weaving length direction (h) at which ~~where~~ several ~~various~~ kinds of weft yarn (19) can be selectively picked into the shed between warp yarns (18, 18). Therefore, ~~in~~ the ~~case of that the~~ woven fabrics shown in Figures 17~~∼~~ -19, are used ~~applied~~ for the elastic cover ~~top~~ material, in the same way as ~~of~~ the ~~application of the~~ weft inserted warp knitted fabric shown in Figure 2.~~,~~ A check pattern with crosswise stripes (75) and lengthwise stripes (76), a crosswise stripe pattern and a lengthwise stripe pattern may be formed ~~drawn~~ depending on the difference between ~~of the kind of the~~ yarns, and the ″regular tensile strength ~~strengh~~″ which ~~may be~~ acts in both width and depth directions (i, q) at the regular strength ~~strengh~~ different positions ~~becomes variable~~.

~~【0075】~~

When ~~As that, in the case of that~~ several ~~various~~ kinds of yarn are selectively applied to the ″regular strength ~~strengh~~ different positions″ of elastic fabric, check patterns and stripe patterns tend to appear ~~appere~~ on the cushioning surface in accordance with differences of characteristics ~~such a specification~~ of the yarn such as finenesses, degree ~~numbers~~ of twist, material ~~meterials of fiber~~ and the ~~a~~ like (Figure 20).

~~【0076】~~

~~First means~~ To avoid such an appearance ~~apperance is that specifications of~~ lowe~~r~~ stretch yarns and high stretch yarns, which are used ~~applied as several various kinds of yarn~~, should ~~are to~~ be the same ~~designed even~~ at the ″regular strength ~~strengh~~ different positions″, and for both ~~that textile design of~~ woven and knitted fabric, the density of warp and weft yarns ~~of woven fabrics, density of warp and weft of knitted fabrics~~ at the ″regular strength ~~strengh~~ different positions″ should ~~is to~~ be ~~designed~~ equal ~~even~~. ~~Other manner~~To further avoid the aforementioned appearance, ~~above apperance is that~~ the surface of

the "regular strength ~~strengh~~ different positions" can ~~are~~ ~~to~~ be covered with cut piles, loop piles, or tufts ~~fluffs~~ formed from the yarns which have the same ~~are even in connection with~~ dyeing properties ~~property~~, fineness, number of twist, material properties ~~meterial of fiber~~, and the ~~a~~ like. When ~~In the case of that~~ the elastic fabric is formed as a ~~in shape of~~ double fabric with a surface stratum formed from face yarns and a back stratum formed from back yarns, lower stretch yarns which have the same ~~are even in connection with~~ material properties ~~meterial of fiber~~, fineness, number of fibers, and degree ~~number~~ of twist are preferably used ~~applied~~ for the surface stratum of the "regular strength ~~strengh~~ different positions".

~~【0077】~~

The elastic yarn having a ~~of which~~ fineness of more than 300 dtex is bar shaped and has a flat, slippery ~~it's~~ surface ~~is flat and slippery~~. Therefore, the surface of the elastic fabric is also flat and slippery. And, when limbs are rested upon ~~is put on~~ an ~~the~~ elastic cover ~~top~~ material formed from such elastic fabric, the limbs cannot be maintained in a comfortable posture, and fatigue~~d~~ occurs ~~feeling must be felt~~.

~~【0078】~~

~~Then,~~ In accordance with the present invention, the average coefficient of friction ~~frictional modulus of elasticity~~ (ω) of the surface of the elastic fabric is increased above ~~designed more than~~ 0.26 ($0.26 \leqq \omega$) by using ~~appling~~ a non-slip yarn, which has fine fibers with ~~of~~ a single fiber fineness less than 30 dtex, to form the elastic fabric, and by floating ~~out~~ the fine fibers over the surface of the elastic fabric so that ~~in a manner of that the fine fibers float out or~~ the non-slip yarn exposes at least ~~among~~ an ~~rectangular~~ area of 1 cm^2 (lengthwise 1 cm × crosswise 1 cm). ~~At this,~~ The average coefficient of friction ~~frictional modulus of elasticity~~ (ω) of the surface of the elastic fabric is calculated ~~calcurated~~ through following steps.

~~【0079】~~

(Step i)

A rectangular test fabric is cut ~~taken~~ out from the elastic fabric, the test fabric having dimensions of ~~size lengthwise~~ 20cm× ~~crosswise~~ 20cm, and is spreaded ~~ed~~ over and fixed on the surface of a metal plate which has a mirror ~~is~~ finish ~~in mirror plane~~ and is supported horizontally.

(Step ii)

A stainless steel rectangular contact segment having dimensions of 10mm X 10mm and 20 ~~lines of cut~~ channels of width 0.1mm and depth 0.1mm across ~~over~~ the undersurface, ~~size lengthwise 10 mm× crosswise 10 mm,~~ is put on the test fabric.

(Step iii)

A load of 50 gf is set on the test fabric through the contact segment.

(Step iv)

The contact segment is moved at a speed of 0.1mm/second to and from ~~m~~ a distance of 30mm in a direction perpendicular to ~~in the right angled direction of~~ the ~~cut~~ channels.

(Step v)

The coefficient of friction ~~Frictional modulus of elasticity~~ ($\omega 1$) in the longitudinal direction of the elastic fabric is calculated by dividing the average value of the frictional force (F_1; gf) between the contact segment and the test fabric by the load (50 gf). The coefficient of friction ~~Frictional modulus of elasticity~~ ($\omega 2$) in the lateral direction of the elastic fabric is calculated by dividing the average value of the frictional force (F_2; gf) between the contact segment and the test fabric by the load (50 gf). The average coefficient of friction ~~frictional modulus of elasticity~~ (ω) of the surface of the elastic fabric is calculated as the average ($0.5\omega 1+0.5\omega 2$) of the coefficient of friction ~~frictional modulus of elasticity~~ ($\omega 1$) in the longitudinal direction and the coefficient of friction ~~frictional modulus of elasticity~~ ($\omega 2$) in the lateral

direction.

~~【0080】~~

A reason to make the fine fibers float ~~out~~ or to expose ~~make~~ the non-slip yarn ~~expose~~ among the rectangular area of 1 cm^2 of the surface of the elastic fabric is that the elastic fabric may be formed similarly ~~in similar~~ to conventional fabric which is made from a fiber of fineness less than 30 dtex.

~~【0081】~~

A reason to set the size of the measuring area of the undersurface of the contact segment at ~~in lengthwise~~ 10mm ×~~crosswise~~ 10mm ~~by the undersurface of the contact segment~~ is that a non-slip effect caused by the non-slip yarn cannot be achieved with ~~expect~~ a porous fabric for ~~of~~ which the space between yarns is ~~designed~~ more than 10mm. ~~So that,~~ It is required to distribute ~~distribut equably~~ the fine fibers of fineness less than 30 dtex uniformly over the whole surface of the elastic fabric to achieve ~~for~~ the non-slip effect due to the non-slip yarn.

~~【0082】~~

~~That is,~~ The present invention intends to ~~relatively~~ minimize the ratio of the exposed ~~exposing~~ area of the thick and slippery elastic yarn through the existence of the fine fibers of fineness less than 30 dtex.

~~【0083】~~

However, it is not necessary ~~needs not~~ to completely cover the surface of the elastic fabric with the fine fibers of fineness less than 30 dtex. Since~~,~~ the surface of the elastic fabric should be ~~is in need of~~ somewhat slippery to promote a comfortable and ~~as far as~~ natural feel to the ~~demeanor and posture of~~ limbs which are not restrained on the surface ~~it and it effects comfortable feeling~~. In consideration of these

matters, an average coefficient of friction ~~frictional modulus of elasticity~~ (ω) of the surface of the elastic fabric should ~~is to~~ be ~~designed~~ less than 0.60 (0.26 $\leqq \omega \leqq$ 0.60), preferably within 0.30～0.50 (0.30 $\leqq \omega \leqq$ 0.50), further preferably within 0.35～0.40 (0.35$\leqq \omega \leqq$ 0.40). To ~~For~~ that end, the ratio of exposed ~~exposing~~ area of the non-slip yarn to ~~in~~ the measuring area, lengthwise 10mm × crosswise 10mm, may ~~be~~ generally ~~designed~~ be less than 50%, preferably within 5%~~～~~-30%, further preferably within 15%~~～~~-25% (generally about 20%).

~~【0084】~~

The following yarns can be used for the non-slip yarn.

(i) spun yarn and napped multifilament yarn having float tufts ~~fluffs~~,

(ii) ring yarn having a ring like bumpy surface formed by annex yarns surrounding ~~climb up~~ a core yarn,

(iii) slub yarn having a slub like bumpy surface formed by annex yarns surrounding ~~climb up~~ a core yarn,

(iv) ~~nep~~ fuzzy ball yarn having a ~~nep~~ fuzzy ball-like bumpy surface formed by annex yarns climbing up a core yarn,

(v) sheath ~~seath~~ core conjugate yarn having a bumpy surface formed by covering core yarn by sheath ~~seath~~ yarn,

(vi) interlaced yarn having a bumpy surface formed by over feeding multifilament,

(vii) chenille yarn formed by fixing decorative yarn to a core yarn,

(viii) flocked ~~flocky~~ yarn formed by electrostatically fixing fiber fragments to a core yarn,

(ix) cord yarn having a napped surface formed by cutting natural leather, synthetic leather, artificial leather, non-woven fabric and the ~~a~~ like.

~~【0085】~~

The elastic fabric may be finished by raising its surface to create a nap on the surface where ~~of~~ the non-slip yarn is

exposed ~~thereon~~. When ~~In the case of application of~~ conventional spun yarn and multifilament yarn are used for the non-slip yarn, the surface of the elastic fabric may be covered with piles formed by these conventional yarns. In this connection, it is desirable to use chenille yarns and flocked ~~flocky~~ yarns as the non-slip yarn, since the surface of these yarns are covered with piles.

~~【0086】~~

In the case where ~~of that~~ the elastic fabric is formed as ~~in~~ a ~~shape of~~ double fabric with a surface stratum formed from face yarns and a back stratum formed from back yarns, it is desirable to apply the elastic yarn to the back fabric (34) and apply the non-slip yarn to the face fabric (32).

Embodiment 〔C－1〕

~~【0087】~~

A polyester spun yarn (fineness: 2ply/meter count of 10 in single yarn) is used in the warp direction ~~set in warping~~ with a warp density ~~of the warp~~ of 64/10cm.

~~A~~ The above-mentioned thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic~~ yarn ~~made of polyether-ester applied to a core component polymer and thermo adhesible polymer, of which melting point is lower than core component polymer, applied to sheath component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd. "Dia-Flora")~~ used in the Embodiment [A-1] is ~~applied to~~ used for the first weft yarn.

A chenille yarn (fineness: meter count of 1/2.8) is used for the second weft yarn. The chenille yarn comprises ~~made by applying a multifilament texturiged yarn (fineness: 167 dtex) to~~ a decorative pile yarn for which a multifilament texturized yarn (fineness: 167 dtex) is used, and ~~by appling~~ a core yarn for which a polyester spun yarn (fineness: cotton count of 20, single fiber ~~fineness:~~ 1.4 dtex) and a thermo adhesible nylon

monofilament yarn (fineness: 78 dtex) ~~to a core yarn is applied to the second weft yarn~~ are used.

The fabric is woven using a ~~applied the~~ twill weave~~s~~ ~~is woven~~ by inserting reciprocally the first weft yarn and the second weft yarn at every pick~~ing~~ with a weft density of ~~the weft~~ 120/10cm.

The woven fabric is finished ~~up~~ as an elastic woven fabric (10) by passing it through a dry-heating treatment at 190℃~~×~~ for 3 minutes and by thermally adhering the warp yarns and the weft yarns.

Stress at 10% elongation (F) in the width direction (r) of the elastic woven fabric (10) is 217 (N/5 cm).

Coefficient of friction ~~Frictional modulus of elasticity~~ (ωh) in the weaving length direction of the elastic woven fabric (10) is 0.375.

Coefficient of friction ~~Frictional modulus of elasticity~~ (ωr) in the weaving width direction of the elastic woven fabric (10) is 0.387.

Average coefficient of friction ~~frictional modulus of elasticity~~(ω) of the surface of the elastic fabric is 0.381.

Embodiment 〔C－2〕

~~【0088】~~

A polyester spun yarn (fineness: 2ply/meter count of 10 in single yarn) is set in warping with a warp density ~~of the warp~~ of 64/10cm.

~~A~~ The above-mentioned thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic~~ yarn ~~made of polyether-ester applied to a core component polymer and thermo adhesible polymer, of which melting point is lower than core component polymer, applied to sheath component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd.~~ "Dia-Flora"~~)~~ is ~~applied to~~ used for the first weft yarn.

~~A~~ The above-mentioned chenille yarn (fineness: meter count of 1/2.8) ~~made by applying a multifilament texturiged yarn (fineness: 167 dtex) to a decorative yarn and by appling a polyester spun yarn (fineness: cotton count of 20, single fiber fineness: 1.4 dtex) and a thermo adhesible nylon monofilament yarn (fineness: 78 dtex) to a core yarn~~ is ~~applied to~~ used for the second weft yarn.

A ring yarn (fineness:meter count of 1/3.8) made by applying a polyester multifilament yarn (fineness: 501 dtex (167×3), single fiber fineness: 3.4 dtex) to an annex yarn, by applying a multifilament texturized ~~texturiged~~ yarn (fineness: 166 dtex (83×2), single fiber fineness: 3.4 dtex) to a core yarn, and by applying a multifilament texturized ~~texturiged~~ yarn (fineness: 83 dtex, single fiber fineness: 3.4 dtex) and a multifilament texturized ~~texturiged~~ yarn (fineness: 167 dtex, single fiber fineness: 3.4 dtex) to a binder yarn, is ~~applied to~~ used for the third weft yarn (non-slip yarn).

The fabric ~~applied the twill weaves~~ is woven in a twill weave by inserting the first weft yarn and the second weft yarn and the third weft yarn in order with density in the weft direction of 136/10cm.

The woven fabric is finished ~~up~~ as an elastic woven fabric (10) by passing it through a dry-heating treatment at 190℃~~×~~ for 3 minutes and by thermally adhering the warp yarn and the weft yarn.

Stress at 10% elongation(F) in the width direction (r) of the elastic woven fabric (10) is 266 (N/5 cm).

Coefficient of friction ~~Frictional modulus of elasticity~~(ωh) in the weaving length direction of the elastic woven fabric (10) is 0.398.

Coefficient of friction ~~Frictional modulus of elasticity~~ (ωr) in the weaving width direction of the elastic woven fabric (10) is 0.391.

Average coefficient of friction ~~frictional modulus of elasticity~~ (ω) of the surface of the elastic fabric is 0.385.

Comparison 〔C－1〕

~~【0089】~~

A polyester spun yarn (fineness: 2ply/meter count of 10 in single yarn) is ~~set~~ in the warp~~ing~~ direction with a density of ~~the warp of~~ 64/10cm.

~~A~~ The above-mentioned thermo adhesible sheath core conjugate elastic polyether-ester ~~elastic~~ yarn ~~made of polyether-ester applied to core component polymer and thermo adhesible polymer, of which melting point is lower than the core component polymer, applied to sheath component polymer (fineness: 2080 dtex, product name of Toyobo Co. Ltd.~~ "Dia-Flora"~~)~~ used in the Embodiment [A-1] is ~~applied to~~ used for the weft yarn.

The fabric ~~applied the twill weaves~~ is woven in a twill weave with a density ~~of~~ in the weft direction of 136/10cm.

The woven fabric is finished ~~up~~ as an elastic woven fabric (10) by passing it through a dry-heating treatment at 190℃~~×~~ for 3 minutes and by thermally adhering the warp yarns and the weft yarns.

~~s~~Stress at 10% elongation (F) in the width direction (r) of the elastic woven fabric (10) is 403 (N/5 cm).

Coefficient of friction ~~Frictional modulus of elasticity~~ (ωh) in the weaving length direction of the elastic woven fabric (10) is 0.202.

Coefficient of friction ~~Frictional modulus of elasticity~~ (ωr) in the weaving width direction of the elastic woven fabric (10) is 0.273.

Average coefficient of friction ~~frictional modulus of elasticity~~ (ω) of the surface of the elastic fabric is 0.238.

~~Industrial Appleability~~

~~【0090】~~

In ~~accin~~ accordance with the present invention, the weight

of limbs loaded on the elastic fabric is distributed ~~disperses~~ in all directions, the fabric deforms to accommodate the shape of the limbs ~~sagged recess is formed there according to the shape of limbs~~, ~~bottomed~~ the fabric does not feel sticky ~~feeling is not felt~~, undulatory puckers or crimps ~~climps~~ do not appear ~~appere~~ over the surface of the elastic fabric. Thus, an ~~the~~ elastic fabric which provides a ~~are rich in~~ soft feeling and has high load-hysteresis fatigue resistance can be obtained. When the elastic fabric is hung ~~hanged~~ over and fixed on ~~to~~ both its edges to frame parts, which are positioned on ~~projected at~~ both sides of a frame, and which are spaced apart from and ~~in~~ opposite to one another, an elastic cover ~~top~~ material which is small ~~sized~~, easy to deal with, light weight, not bulky, and on which limbs ~~limds~~ may be supported stably ~~in stable~~ can be obtained.